DANA SPICER®
Off-Highway Products

Service Manual

Axle 112

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INTRODUCTION

The efficiency and continued operation of mechanical units depend on constant, correct maintenance and also on efficient repair work, should there be a break-down or malfunction. The instructions contained in this manual have been based on a complete overhaul of the unit. However, it is up to the mechanic to decide whether or not it is necessary to assemble only individual components, when partial repair work is needed. The manual provides a quick and sure guide which, with the use of photographs and diagrams illustrating the various phases of the operations, allows accurate work to be performed.All the information needed for correct disassembly, checks and assembly of each individual component is set out below. In order to remove the differential unit from the vehicle, the manuals provided by the vehicle manufacturer should be consulted. In describing the following operations it is presumed that the unit has already been removed from the vehicle.

IMPORTANT: In order to facilitate work and protect both working surfaces and operators, it is advisable to use proper equipment such as: trestles or supporting benches, plastic or copper hammers, appropriate levers, pullers and specific spanners or wrenches. Before going on to disassemble the parts and drain the oil, it is best to thoroughly clean the unit, removing any encrusted or accumulated grease.

INTRODUCTORY REMARKS: All the disassembled mechanical units should be thoroughly cleaned with appropriate products and restored or replaced if damage, wear, cracking or seizing have occurred. In particular, thoroughly check the condition of all moving parts (bearings, gears, crown wheel and pinion, shafts) and sealing parts (o-rings, oil shields) which are subject to major stress and wear. In any case, it is advisable to replace the seals every time a component is overhauled or repaired. During assembly, the sealing rings must be lubricated on the sealing edge. In the case of the crown wheel and pinion, replacement of one component requires the replacement of the other one. During assembly, the prescribed pre-loading, backlash and torque of parts must be maintained.

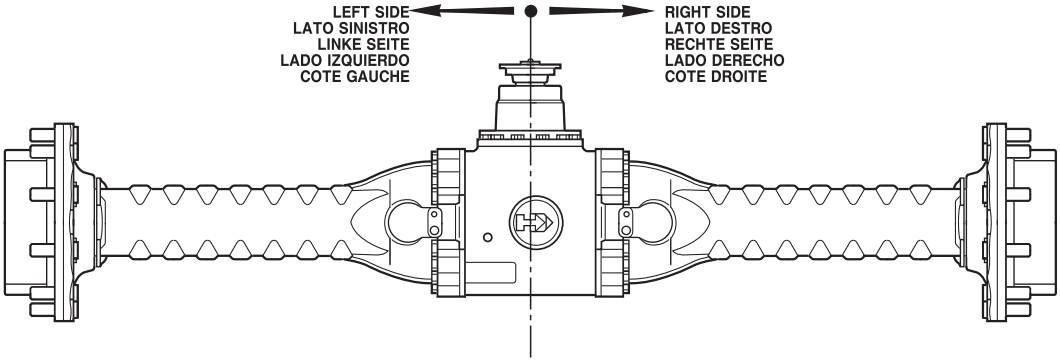
SPECIFIC EQUIPMENT AND SPARE PARTS: The drawings of all specific tools required for maintenance and repair work can be found at the end of this manual ; spare parts may be ordered either from the vehicle manufacturer or directly from the Service Centers or Authorized Distributors of Dana Holding.

VERSION TRACKING

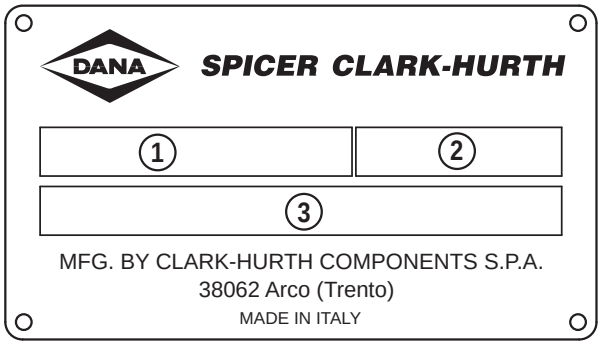
FILE NAME	REVISION	DATE	CHANGES DESCRIPTION
ASM-0004_eng_06072015	Rev. 02	06/07/2015	Added paragraph “OIL DRAINING MANDATORY PROCEDURE p. 14” and updated paragraph “SAFETY PRECAUTIONS p. 17”.
ASM-0004E.Rev.04.10_2015	Rev. 03	23/10/2015	Added new chapters “PLANETARY REDUCTION 6:9 p. 161”,” FLANGED PINION TO GEARBOX WITH FLOATING FLANGE p. 175” and “DIFFERENTIAL WITH BLOCK TO SPHERES 100% p. 183”.

SPECIFICATIONS

DEFINITION OF VIEWPOINTS



DATA PLATE



1 - Type and model unit - modification index

2 - Serial number

3 - Lubricant

CONVERSION TABLES

UNITS OF PRESSURE

	Atm	Bar	MPa	Pa	PSI
Atm	1	1	0,1	10^5	14,4
Bar	1	1	0,1	10^5	14,4
MPa	10	10	1	10^6	144
Pa	0,00001	0,00001	10^{-6}	1	-
PSI	-	-	-	-	1

UNIT OF WEIGHT

	N	daN	kN	kg	lbs
1N	1	0,1	0,001	0,102	0,225
1daN	10	1	0,01	1,02	2,25
1kN	1000	100	1	102	225
1kg	9,81	0,981	0,00981	1	2,205

UNITS OF TORQUE

	N·m	daN·m	kN·m	kg·m	lb·in
1N·m	1	0,1	0,001	0,102	8,854
1daN·m	10	1	0,01	1,02	88,54
1kN·m	1000	100	1	102	8854
1kg·m	9,81	0,981	0,00981	1	86,8
1 lb·in	0,1129	0,01129	0,0001129	0,01152	1

TORQUE SPECIFICATIONS

COARSE PITCH

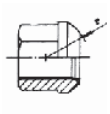
SIZE OF BOLT	TYPE OF BOLT					
	8.8	8.8 + Loctite 270	10.9	10.9 + Loctite 270	12.9	12.9 + Loctite 270
M6 x 1 mm	9,5 – 10,5 N·m	10,5 – 11,5 N·m	14,3 – 15,7 N·m	15,2 – 16,8 N·m	16,2 – 17,8 N·m	18,1 – 20 N·m
M8 x 1,25 mm	23,8 – 26,2 N·m	25,6 – 28,4 N·m	34,2 – 37,8 N·m	36,7 – 40,5 N·m	39 – 43 N·m	43,7 – 48,3 N·m
M10 x 1,5 mm	48 – 53 N·m	52 – 58 N·m	68 – 75 N·m	73 – 81 N·m	80 – 88 N·m	88 – 97 N·m
M12 x 1,75 mm	82 – 91 N·m	90 – 100 N·m	116 – 128 N·m	126 – 139 N·m	139 – 153 N·m	152 – 168 N·m
M14 x 2 mm	129 – 143 N·m	143 – 158 N·m	182 – 202 N·m	200 – 221 N·m	221 – 244 N·m	238 – 263 N·m
M16 x 2 mm	200 – 221 N·m	219 – 242 N·m	283 – 312 N·m	309 – 341 N·m	337 – 373 N·m	371 – 410 N·m
M18 x 2,5 mm	276 – 305 N·m	299 – 331 N·m	390 – 431 N·m	428 – 473 N·m	466 – 515 N·m	509 – 562 N·m
M20 x 2,5 mm	390 – 431 N·m	428 – 473 N·m	553 – 611 N·m	603 – 667 N·m	660 – 730 N·m	722 – 798 N·m
M22 x 2,5 mm	523 – 578 N·m	575 – 635 N·m	746 – 824 N·m	817 – 903 N·m	893 – 987 N·m	974 – 1076 N·m
M24 x 3 mm	675 – 746 N·m	732 – 809 N·m	950 – 1050 N·m	1040 – 1150 N·m	1140 – 1260 N·m	1240 – 1370 N·m
M27 x 3 mm	998 – 1103 N·m	1088 – 1202 N·m	1411 – 1559 N·m	1539 – 1701 N·m	1710 – 1890 N·m	1838 – 2032 N·m
M30 x 3,5 mm	1378 – 1523 N·m	1473 – 1628 N·m	1914 – 2115 N·m	2085 – 2305 N·m	2280 – 2520 N·m	2494 – 2757 N·m

FINE PITCH

SIZE OF BOLT	TYPE OF BOLT					
	8.8	8.8 + Loctite 270	10.9	10.9 + Loctite 270	12.9	12.9 + Loctite 270
M8 x 1 mm	25,7 – 28,3 N·m	27,5 – 30,5 N·m	36,2 – 39,8 N·m	40 – 44 N·m	42,8 – 47,2 N·m	47,5 – 52,5 N·m
M10 x 1,25 mm	49,4 – 54,6 N·m	55,2 – 61 N·m	71,5 – 78,5 N·m	78 – 86 N·m	86 – 94 N·m	93 – 103 N·m
M12 x 1,25 mm	90 – 100 N·m	98 – 109 N·m	128 – 142 N·m	139 – 154 N·m	152 – 168 N·m	166 – 184 N·m
M12 x 1,5 mm	86 – 95 N·m	94 – 104 N·m	120 – 132 N·m	133 – 147 N·m	143 – 158 N·m	159 – 175 N·m
M14 x 1,5 mm	143 – 158 N·m	157 – 173 N·m	200 – 222 N·m	219 – 242 N·m	238 – 263 N·m	261 – 289 N·m
M16 x 1,5 mm	214 – 236 N·m	233 – 257 N·m	302 – 334 N·m	333 – 368 N·m	361 – 399 N·m	394 – 436 N·m
M18 x 1,5 mm	312 – 345 N·m	342 – 378 N·m	442 – 489 N·m	485 – 536 N·m	527 – 583 N·m	580 – 641 N·m
M20 x 1,5 mm	437 – 483 N·m	475 – 525 N·m	613 – 677 N·m	674 – 745 N·m	736 – 814 N·m	808 – 893 N·m
M22 x 1,5 mm	581 – 642 N·m	637 – 704 N·m	822 – 908 N·m	903 – 998 N·m	998 – 1103 N·m	1078 – 1191 N·m
M24 x 2 mm	741 – 819 N·m	808 – 893 N·m	1045 – 1155 N·m	1140 – 1260 N·m	1235 – 1365 N·m	1363 – 1507 N·m
M27 x 2 mm	1083 – 1197 N·m	1178 – 1302 N·m	1520 – 1680 N·m	1672 – 1848 N·m	1834 – 2027 N·m	2000 – 2210 N·m
M30 x 2 mm	1511 – 1670 N·m	1648 – 1822 N·m	2138 – 2363 N·m	2332 – 2577 N·m	2565 – 2835 N·m	2788 – 3082 N·m

WHEEL NUT TIGHTENING TORQUES

Wheel nut tightening torques recommended from rim's O.E.M. with reference to the quality of the rim's material.

WHEEL NUT TIGHTENING TORQUES				
CHARACTERISTICS	**ILLUSTRATION**	**WHEEL STUD THREAD**	**RECOMMENDED WHEEL NUTS TORQUE**	
			RIM MATERIAL QUALITY	
			ST 37	****ST 52**
WHEEL NUTS WITH INTEGRATE SPHERICAL COLLAR		M18 x 1,5 mm	330 N·m	460 N·m
		M20 x 1,5 mm	490 N·m	630 N·m
		M22 x 1,5 mm	630 N·m	740 N·m
FLAT COLLAR WHEEL NUTS WITH SEPARATE SPHERICAL LOCK WASHER		M18 x 1,5 mm	270 N·m	360 N·m
		M20 x 1,5 mm	360 N·m	450 N·m
		M22 x 1,5 mm	460 N·m	550 N·m
WHEEL NUTS WITH INTEGRATE SEAT CAPTIVE WASHER		M18 x 1,5 mm	260 N·m	360 N·m
		M20 x 1,5 mm	350 N·m	500 N·m
		M22 x 1,5 mm	450 N·m	650 N·m

****RIM MATERIAL ST 52 IS RECOMMENDED BY DANA ON AXLE APPLICATION. IT IS THE OPTIMUM MATERIAL FOR TIGHTENING THE RIM TO THE HUB.**

NOTE:

The wheel nut tightening torque is related only on nut thread and stud thread dry. (Without oil or any lubricant).

NOTE:

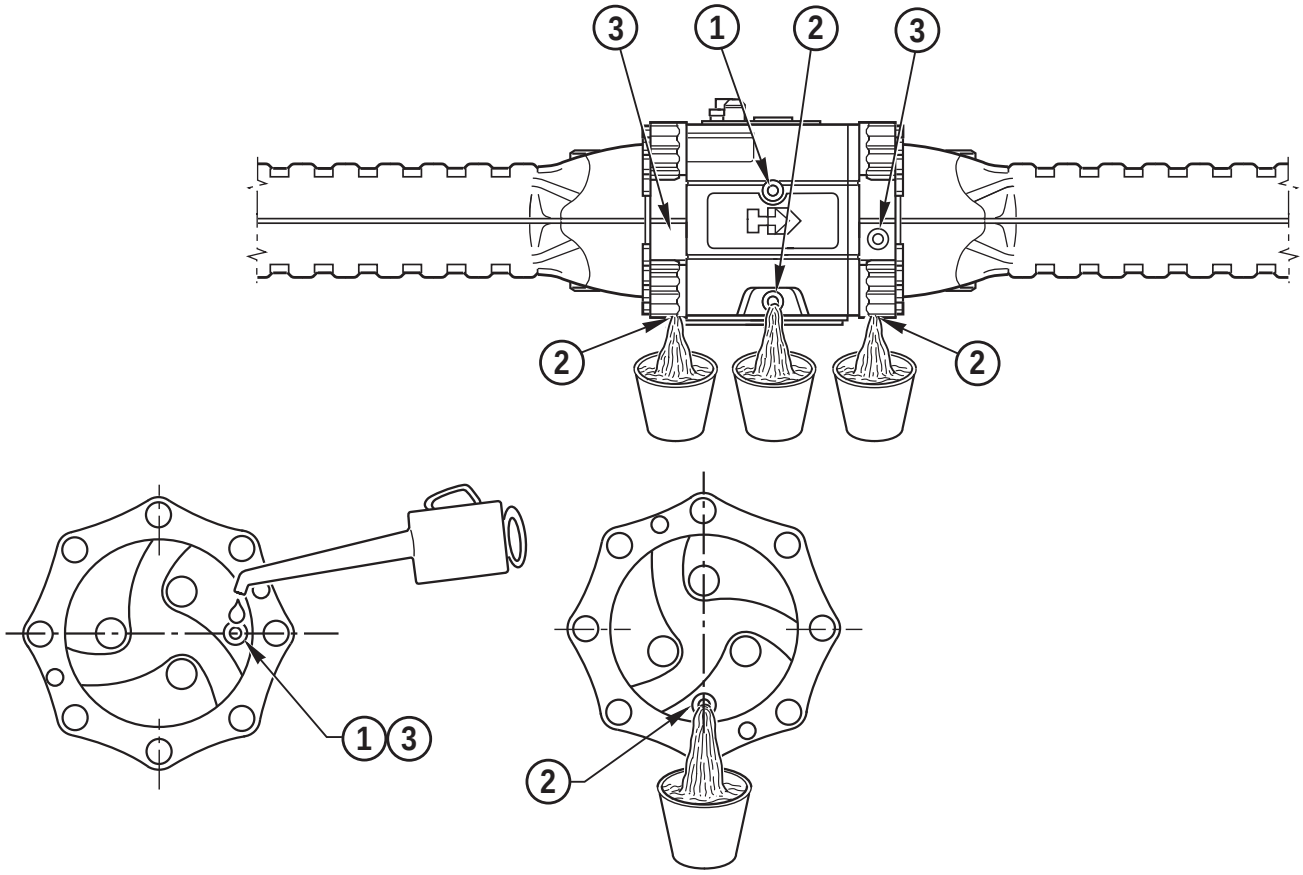
The wheel nut tightening torque takes into consideration not only the nut + stud characteristics, but also the quality of the rim material.

THE DANA OFFICIAL TIGHTENING TORQUE TABLE, THAT IS INCLUDE IN EACH SERVICE MANUAL, SHOWS THE TORQUE FIGURE RELATED TO THE BOLT CHARACTERISTIC ONLY .		
DANA OFFICIAL TIGHTENING TORQUE TABLE		
NUT MATERIAL QUALITY 8.8 & 10.9	STUD MATERIAL QUALITY 10.9	*ALLOW TIGHT TORQUE
M18 x 1,5 mm	M18 x 1,5 N·m	442 - 489 N·m
M20 x 1,5 mm	M20 x 1,5 N·m	613 - 677 N·m
M22 x 1,5 mm	M22 x 1,5 N·m	822 - 908 N·m

***THE TORQUE FIGURE ON NUT AND STUD COUPLING MUST BE RELATED ON STUD MATERIAL QUALITY (DANA AXLE ARE 10.9 ONLY).**

MAINTENANCE

MAINTENANCE POINTS



1 - Oil filling plug

2 - Oil draining plug

3 - Check level plug

OIL DRAINING MANDATORY PROCEDURE

⚠WARNING

- Do not attempt any maintenance if the axle is hot (40-50°C / 104-122°F). Hot oil and components can cause personal injury. Avoid skin contact. Wear protective gloves and glasses.
- Make sure all fluids are contained during inspection, maintenance, tests, adjustment and repair of the product. Prepare a suitable container to collect the fluid before removing any component containing fluids. Dispose of all fluids following legal and local regulations.

CENTRAL HOUSING

Before draining oil it is mandatory to loosen the oil filling plug or the breather (if present), and wait until the internal pressure is completely released. Remove the oil draining plug and drain oil only when the pressure is completely released.

PLANETARY GEAR REDUCTION

Before draining oil it is mandatory to rotate the planetary gear reduction in order to move the oil plug in filling position, then loosen the oil plug and wait until the internal pressure is completely released. Remove the oil plug and drain oil only when the pressure is completely released.

MAINTENANCE INTERVALS

OPERATION	COMPARTMENT	1ST CHANGE / CHECK (whs)	FREQUENCY (whs)	LUBRICANTS	REMARKS
Oil level check	All	10 whs	Monthly	For details see below	Clean carefully oil plug magnet
Oil Change	Differential	100 - 250 whs max. *	1000 whs	Central body standard bevel gears - UTTO (API GL4), or gear: J20/C, MF M1143, or gear: SAE80W/90 (API GL4 or GL5)	If with limited slip differential, and/or wet brakes, use LS additivated oils. Clean carefully oil plug magnet.
				Central body hypoid bevel gears - SAE80W/90 (API GL5)	
	Hub Reduction	100 - 250 whs max. *		UTTO (API GL4) J20/C; or gear: SAE80W/90 (API GL4 or GL5)	Clean carefully oil plug magnet.
	Dropbox (if any)	100 - 250 whs max. *		Gears with wet discs clutch - ATF GM Dexron IIE, Dexron III	Clean carefully oil plug magnet. * in accordance with Machine Service requirements
				Only gears - UTTO J20/C, or gear: SAE80W/90 (API GL4 or GL5)	
Adjustment	Negative brake (SAHR)	100 whs	Every 500 whs	For hydraulic actuations (brakes, SAHR, 100% diff. lock, etc.) use ATF oil e.g. GM Dexron IIE, Dexron III	Not applicable
	Service brake				DOT brake fluids oils are NOT compatible w/std oils
Tightening	Wheel nuts	10 whs	Every 200 whs	No lubricant allowed	Check for any damage or corrosion of treads or mating surfaces
Greasing	King Pin Tapered Bearings	10 whs	Normal work – Weekly or Severe duty – Daily	NLGI2 EP or NLGI3 EP	Supply grease until clean grease is visible from outside. Grease performance level acc. to: According to DIN 51825 level KP2K-30 (NLGI2) or KP3K-20 (NLGI3); ASTM D4950 NLGI2 GC-LB
	Seals	10 whs			
	King Pin Bushings	10 whs		NLGI2 EP or NLGI3 EP with Moly Addittive	
	Trunnion Bushings	10 whs			

In case of severe duty, half oil change intervals must be applied.
In case of extreme enviroments, chatter noise, reduce oil change intervals accordingly.
In case of extremely low ambient temperatures (<-20°C), use appropriate oils w/ low viscosity: UTTO J20/D (std Bevel Gears), SAE 75W/90 API GL5 LS (Hypoid Bevel Gears: models 192, 193, 194).
API GL5: Acc. To MIL L-2105-B
See PSB 00279 (latest update) for more info regarding lubricants and viscosity grades.

LUBRICANT & SEALANT SPECIFICATIONS

1 - Locking, sealing and lubricating materials referred to in this manual are the same used in the shop-floor.

2 - The table below gives an account of the typical applications of each single material, in order to facilitate replacement with similar products marketed by different brand names with different trade marks.

LOCTITE 242

Anaerobic product apt to prevent the loosening of screws, nuts and plugs. Used for medium-strength locking. Before using it, completely remove any lubricant by using the specific activator.

LOCTITE 243

The oleocompatible alternative to 242. Does not require the activation of lubricated surfaces.

LOCTITE 270

Anaerobic product for very-high strength locking of screws and nuts. Before using it, completely remove any lubricant by using the specific activator.

To remove parts, it may be necessary to heat them at 80° C approximately.

LOCTITE 275

Anaerobic product suitable for high-strength locking and sealing of large threaded parts, bolts and stud bolts, for pipe sealing and for protecting parts against tampering; suitable for sealing coupling surfaces with a maximum diametrical clearance of 0.25 mm.

LOCTITE 510

Anaerobic product for the hermetic sealing of flanged units and screw holes communicating with fluids. Can seal clearances between flanges up to 0.2 mm.

LOCTITE 577

Quick anaerobic sealant for sealing threaded portions of conical or cylindrical unions up to M80. Before using it, remove any lubricant with the specific activator. After polymerisation, disassembly may result rather difficult, so heating may be necessary for larger diameters.

LOCTITE 638

Anaerobic adhesive for fast and high-strength gluing of cylindrical metal joints (hub on shaft). Can glue together parts with clearance ranging between 0.1 and 0.25 mm.

LOCTITE 648

Anaerobic adhesive for fast and medium-strength gluing of cylindrical metal joints (hub on shaft). Can glue together parts with radial clearance below 0.1 mm.

AREXONS (REPOSITIONABLE JOINTING COMPOUND FOR SEALS)

Solvent-based sealing compound for elastic seals, drying through evaporation. Used for sealing the outer diameter of sealing rings for rotating shafts with outer metal reinforcement.

SILICONE

Semi-fluid adhesive material used for sealing and filling and to protect components from environmental and physical elements. Polymerises with non-corrosive dampness.

TECNO LUBE/101 (SILICONE-BASED GREASE)

Highly adhesive synthetic grease, with silicone compounds added.

Applied to adjustment screws with hole communicating with oil-type fluids.

Used when frequent adjusting is required.

MOLIKOTE (DOW CORNING)

Lubricating compound containing molybdenum disulphide, used to lubricate articulation pins and to prevent sticking and oxidation of parts that are not lubricated on a regular basis.

(LITHIUM-BASED) GREASE

Applied to bearings, sliding parts and used to lubricate seals or parts during assembly.

SAFETY PRECAUTIONS

1 - During all operations described in this manual, the axle should be fastened onto a trestle, while the other parts mentioned should rest on supporting benches.

2 - When removing one of the arms, an anti-tilting safety trestle should be placed under the other arm.

3 - When working on an arm that is fitted on the machine, make sure that the supporting trestles are correctly positioned and that the machine is locked lengthways.

4 - Do not admit any other person inside the work area; mark off the area, hang warning signs and remove the ignition key from the machine.

5 - Use only clean, quality tools; discard all worn, damaged, lowquality or improvised wrenches and tools. Ensure that all torque wrenches have been checked and calibrated.

6 - During maintenance operations, always wear protective glasses, safety footwear, protective gloves and all P.P.E. (Personal Protective Equipment) in function of the risks which the workers may be exposed to.

7 - Should you stain a surface with oil, remove marks straight away.

8 - Dispose of all lubricants, seals, rags and solvents once work has been completed. Treat them as special waste and dispose of them according to the relative law provisions obtaining in the country where the axles are being overhauled.

9 - Make sure that only weak solvents are used for cleaning purposes; avoid using turpentine, dilutants and toluol, xylolbased or similar solvents; use light solvents such as Kerosene, mineral spirits or water-based, environment friendly solvents.

10 - For the sake of clarity, the parts that do not normally need to be removed have not been reproduced in some of the diagrams.

11 - After repair work has been completed, accurately touch up any coated part that may have been damaged.

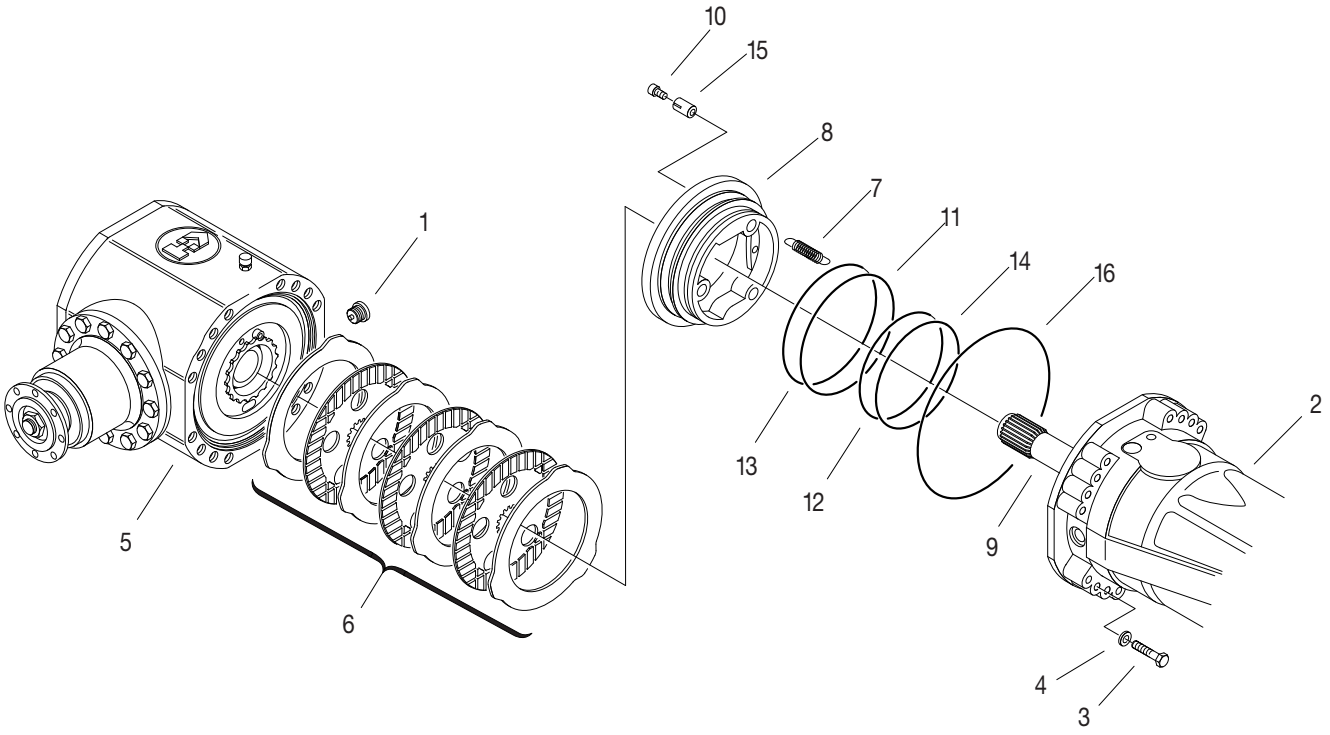
12 - Follow all safety instructions in the Original Equipment Manufacturer (OEM) manual that came with the vehicle.

13 - Before draining oil, release the internal pressure, for details see OIL DRAINING MANDATORY PROCEDURE p. 14.

DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates an imminently hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a situation which, if not avoided, may result in damage to components.
NOTICE	Indicates information which may make product service easier to perform.

CHECKING WEAR AND REPLACING THE BRAKING DISCS

EXPLODED VIEW



DISASSEMBLY

⚠CAUTION

Before draining oil, release the internal pressure, for details see OIL DRAINING MANDATORY PROCEDURE p. 14.

⚠CAUTION

Perform all operations on both arms.

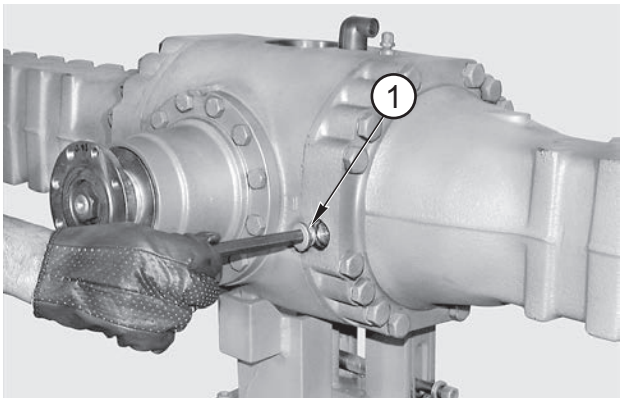


FIGURE 1: Remove the oil-level plug (1).

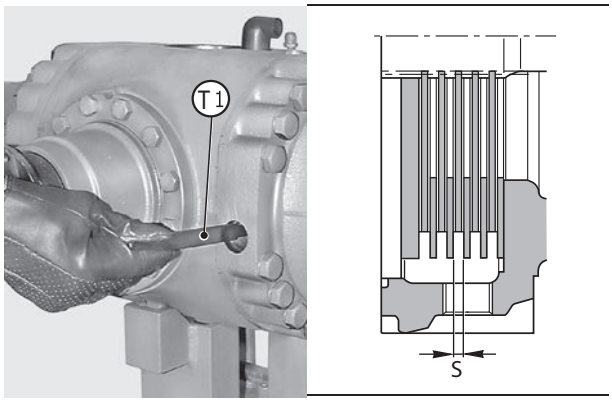


FIGURE 2: Apply the brakes and, keeping them under pressure, check the linings "S" between the disks using tool T1 (See drawing T1 p. 24).
Minimum "S": 4.5 mm.

⚠CAUTION

Replace the braking disks and the intermediate disks on both sides if necessary.

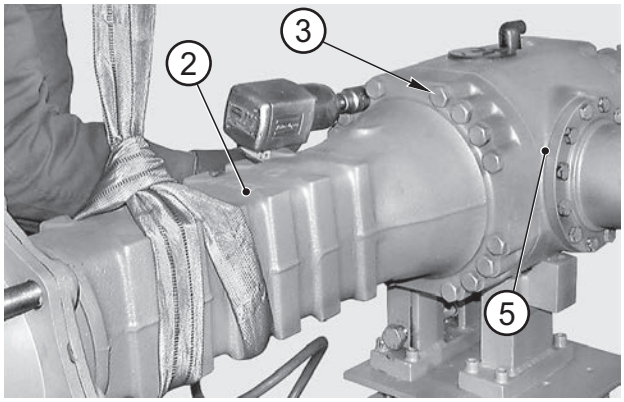


FIGURE 3: Loosen and remove the screws (3) and the washers (4) that fix the arm (2) to the central body (5).

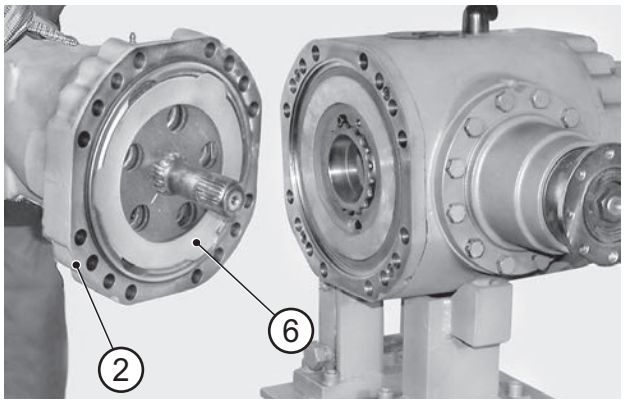


FIGURE 4: Remove the arm (2) together with the pack of the braking disks (6).
Place the arm on a bench.

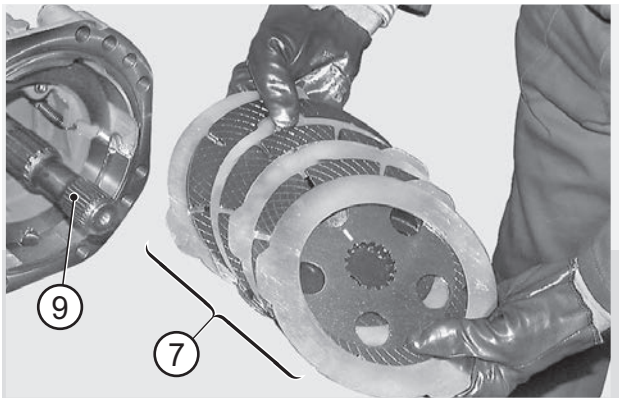


FIGURE 5: Remove the braking disks (6) and write down their order of assembly.

NOTE:

1 - If the disks do not need replacing, avoid switching their position.

2 - Extract the axle shaft (9).

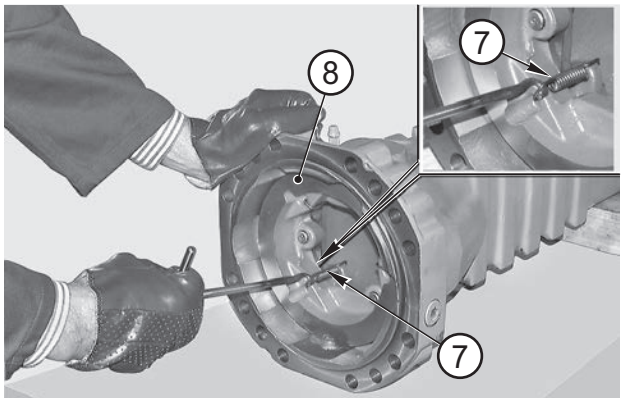


FIGURE 6: Remove the reversal springs (7) from the piston (8).

NOTE:

If the springs (7) are weak or deformed they must be replaced.

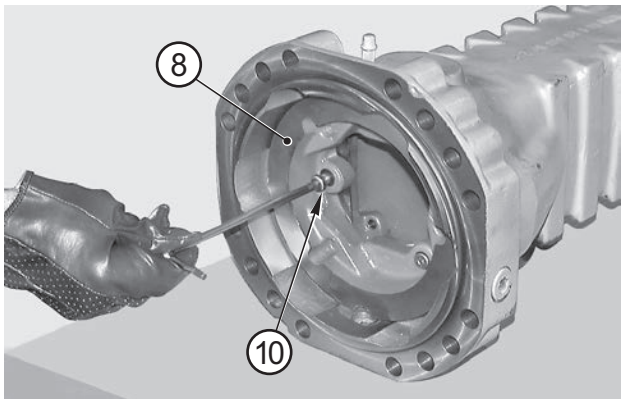


FIGURE 7: Remove the pin screws (10) guiding the piston (8). See MECHANICAL PARKING BRAKE p. 65 o HYDRAULIC NEGATIVE BRAKE p. 149.

⚠CAUTION

If the screws are to be replaced, write down the different colors for the different brake gaps.

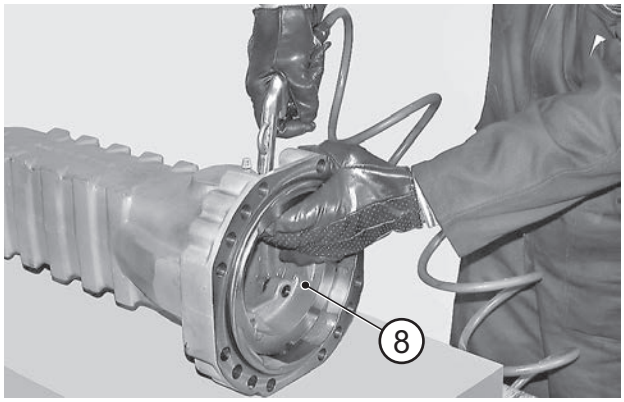


FIGURE 8: Slowly introduce compressed air through the connection of the braking circuit in order to extract the entire piston.

⚠CAUTION

Hold on to the piston as it may be suddenly ejected and damaged.

ASSEMBLY

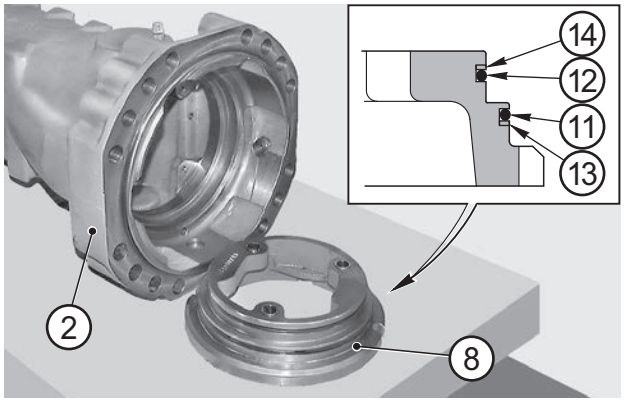


FIGURE 9: Accurately clean the piston (8) and the seats of slide and seal. Replace the o-rings (11) and (12) and the anti-extrusion rings (13) and (14); make sure that the assembly side is correct.

⚠CAUTION

Accurately check the positioning of the anti-extrusion rings (13) and (14).

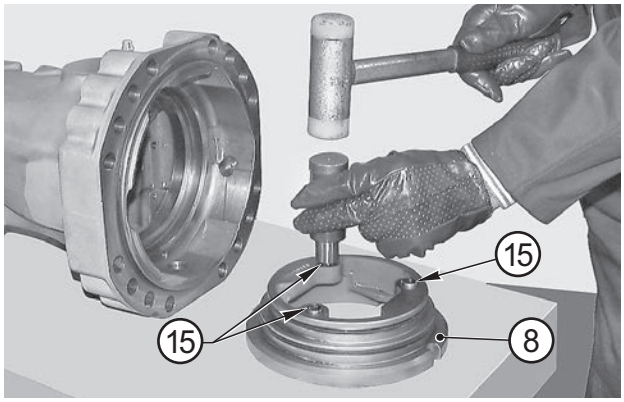


FIGURE 10: Insert the stroke automatic regulation springs (15); place them in line with the piston (8).

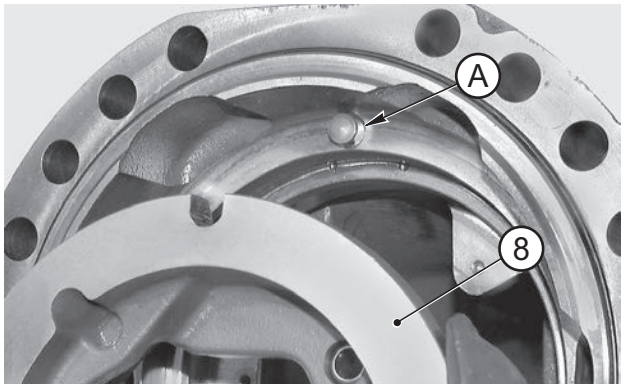


FIGURE 11: Lubricate the seals (11,12) and fit the piston (8) into the arm (2).

⚠CAUTION

Make sure that the piston seat fits into the stop pin "A" inside the arm.

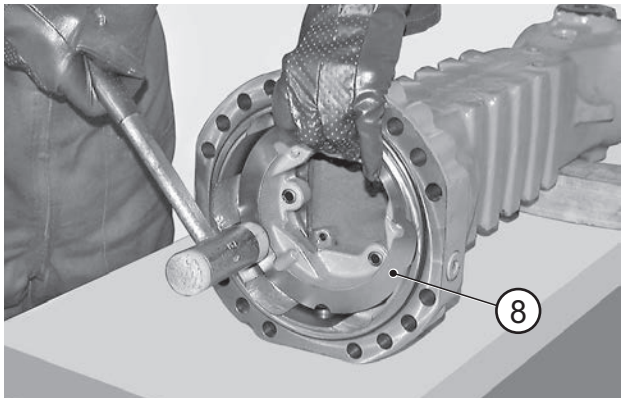


FIGURE 12: Assist the insertion of the piston (8) by lightly hammering around the edge with a plastic hammer.

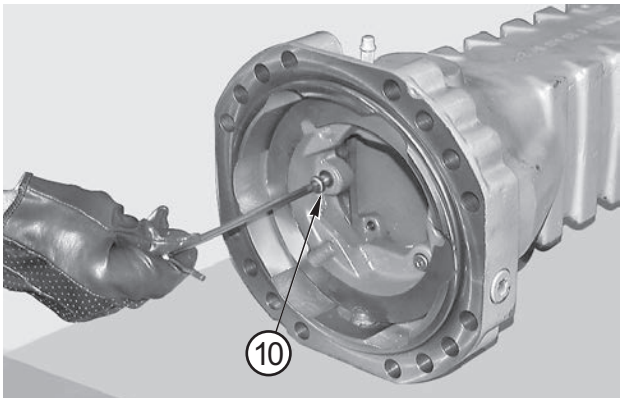


FIGURE 13: Fit the pin screws (10) making sure that they are all of the same color.
White: 1 mm gap
Yellow: 0.75 mm gap
Blue: 0.5 mm gap
Apply Loctite 270 to the thread.
Torque wrench setting: 5 - 7 N·m.

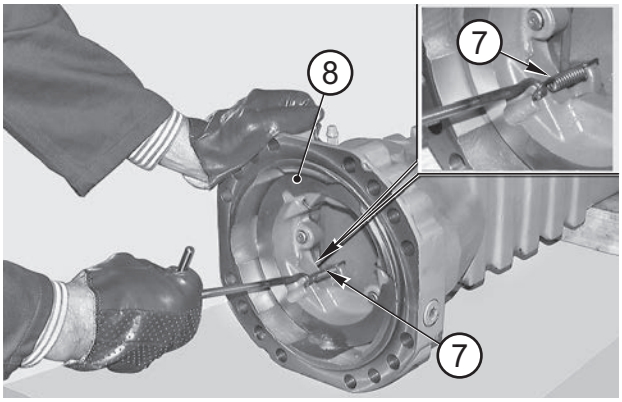


FIGURE 14: Fit the reversal springs (7) on the piston (8).

⚠CAUTION

Pay attention not to deform the connections of the springs.

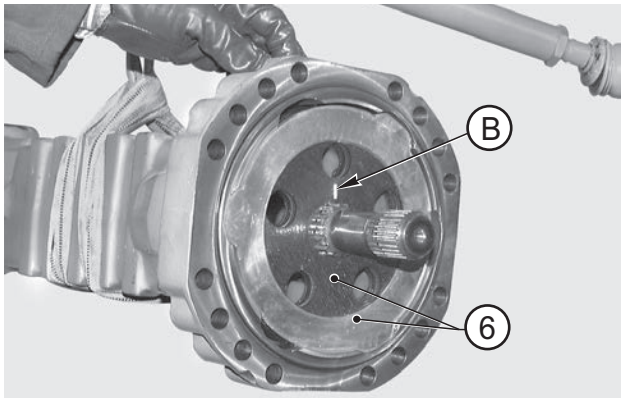


FIGURE 15: Slightly lubricate the braking disks (6) and fit them in the arm following the correct sequence; orient them so that the oil circulation holes and the marks "B" are perfectly lined up.

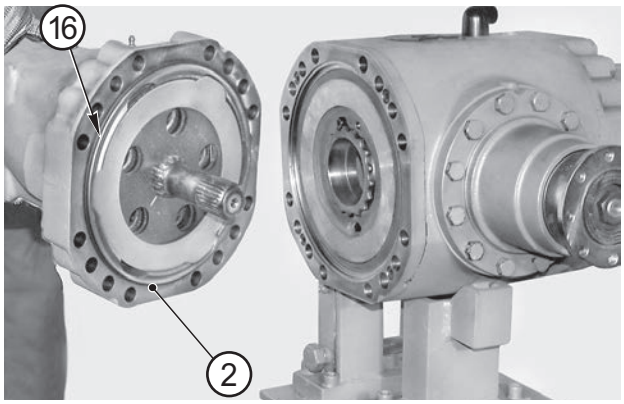


FIGURE 16: Check that the positioning of the sealing ring (16) on the arm is intact; install the complete arm (2).
Lock it into position using two facing screws (3) and washers (4).

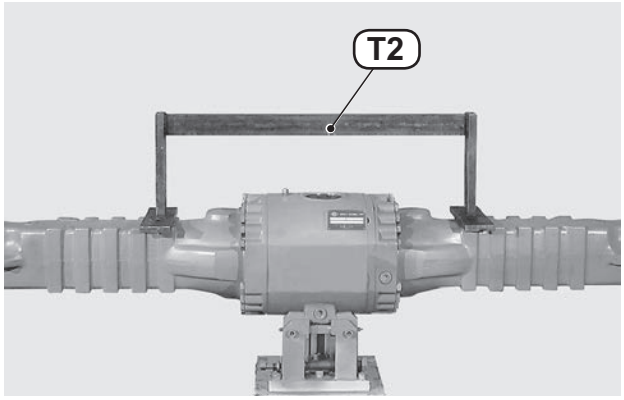
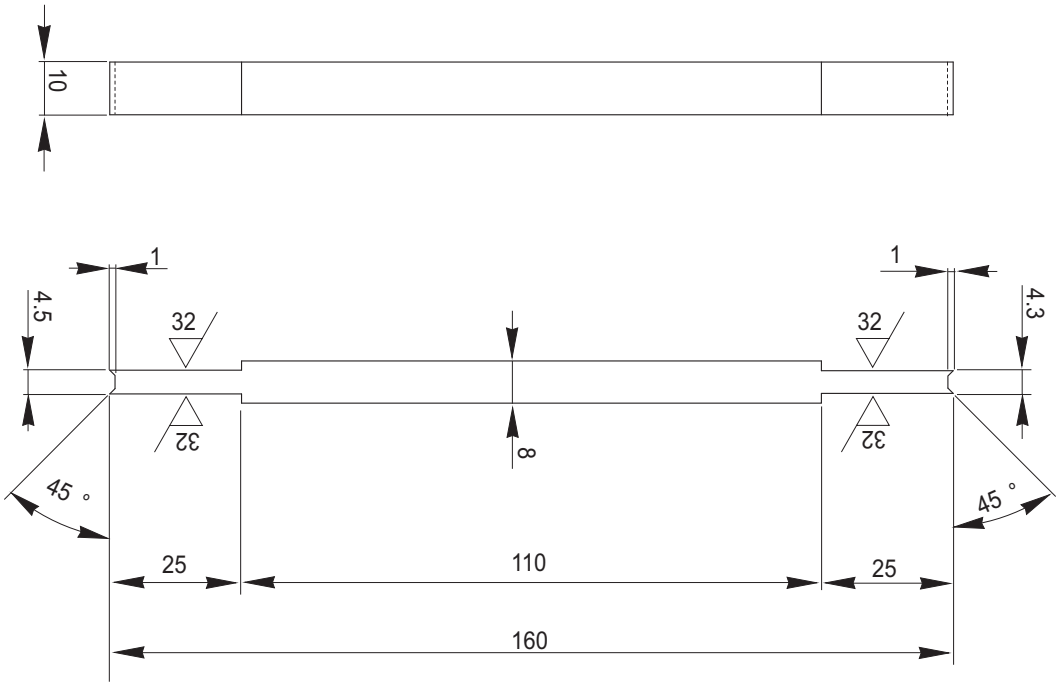


FIGURE 17: Check the flatness of the arms using tool T2 (See drawing T2 p. 24) and finally lock the arms with the screws (3) and the washer (4) using the criss-cross method.
Torque wrench setting: 298 N·m

SPECIAL TOOLS

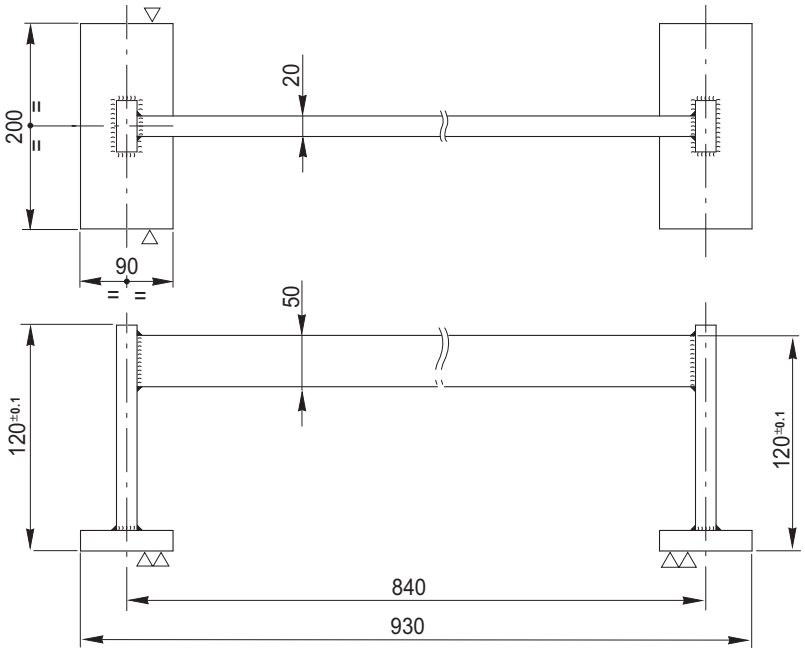
T1

P/N: 2313



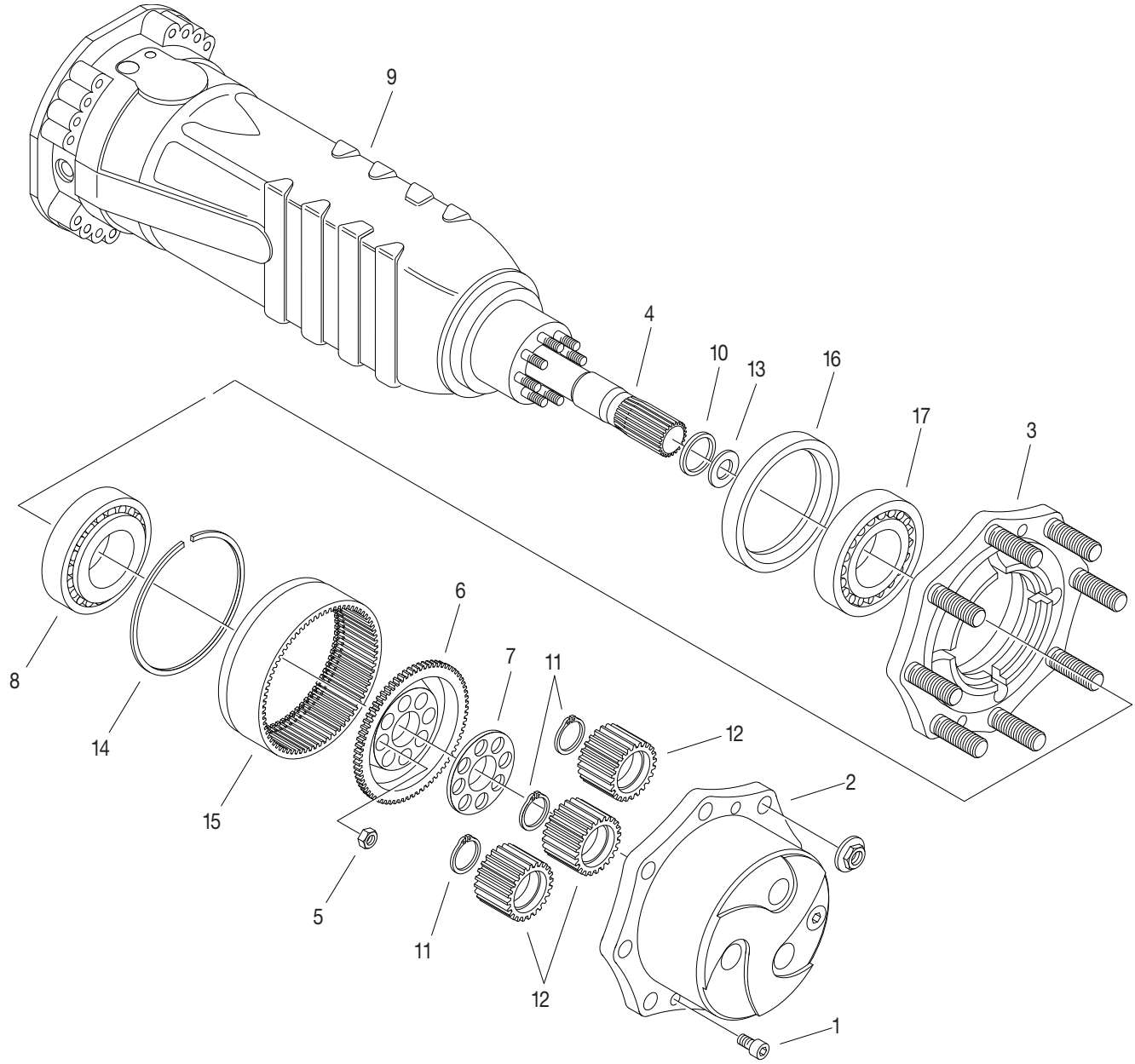
T2

P/N: 2305



PLANETARY REDUCTION AND AXLE SHAFT

EXPLODED VIEW



DISASSEMBLY

⚠CAUTION

Before draining oil, release the internal pressure, for details see OIL DRAINING MANDATORY PROCEDURE p. 14.

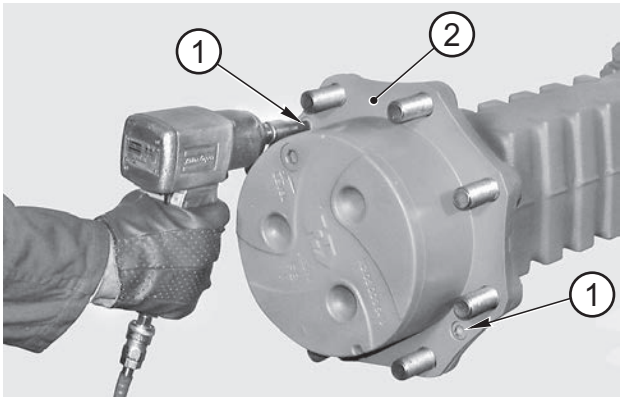


FIGURE 1: Remove the securing screws (1) from the spider cover (2).

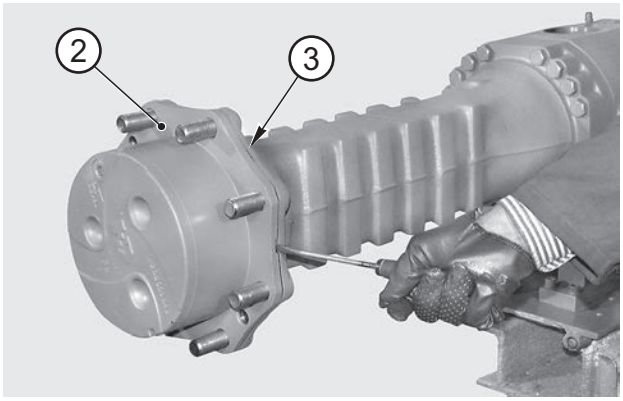


FIGURE 2: Disjoin the spider cover (2) from the hub (3) by alternatively forcing a screwdriver into the appropriate slots.

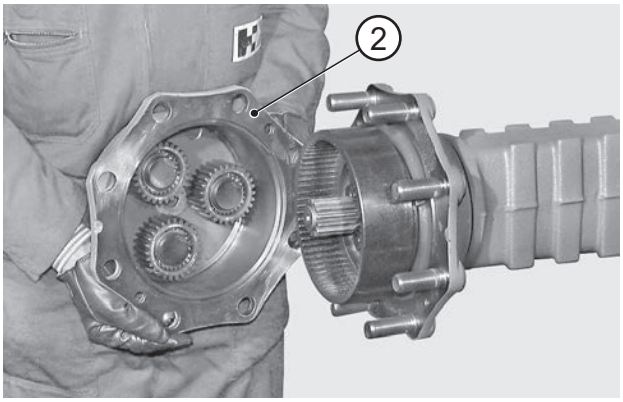


FIGURE 3: Remove the complete planetary carrier cover (2).

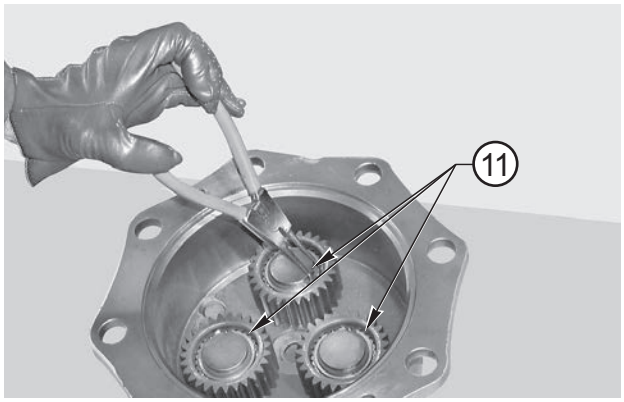


FIGURE 4: Remove the snap rings (11).

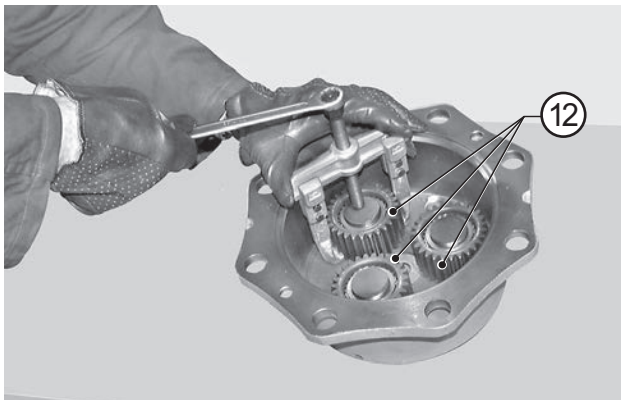


FIGURE 5: With the help of a puller, remove the planetary wheel gears (12).

NOTE:

Write down the assembly side of planetary wheels.

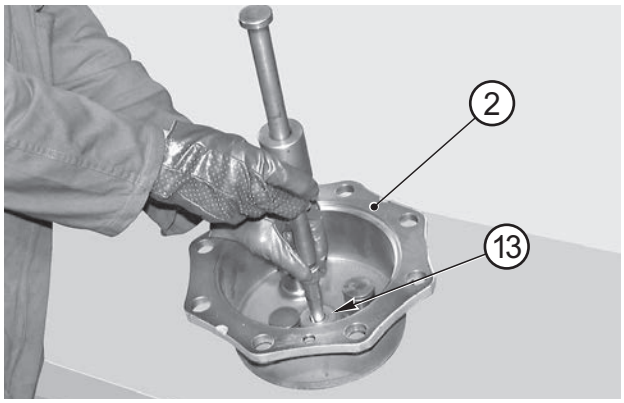


FIGURE 6: Using a puller for inner parts, remove shim washer (13) from planetary cover (2).

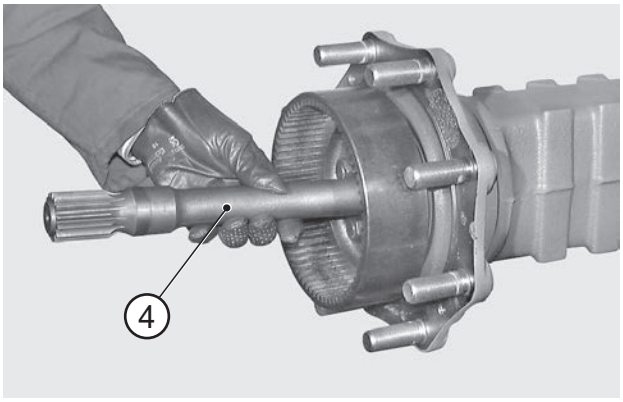


FIGURE 7: Remove the complete axle shaft (4).

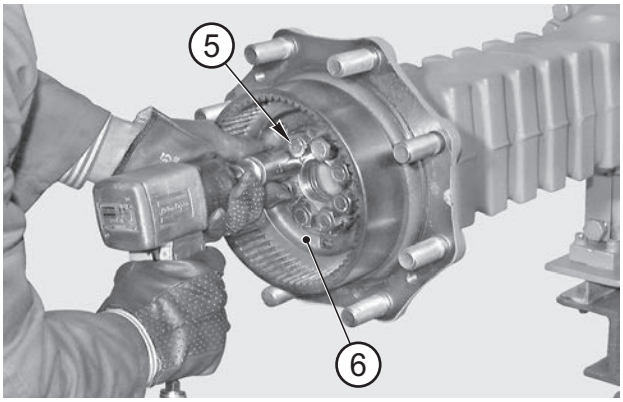


FIGURE 8: Loosen and remove the tightening nuts (5) from the crown flange (6).

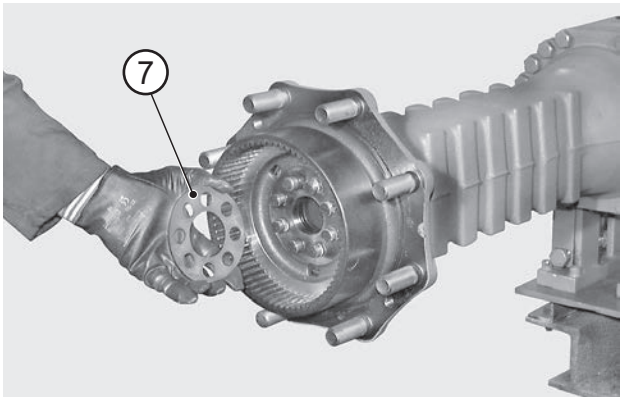


FIGURE 9: Remove the safety flange (7).

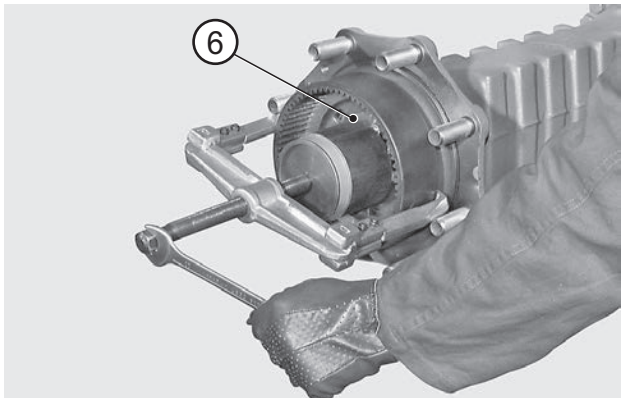


FIGURE 10: Using a puller, remove the complete crown flange (6) by acting on the stud bolts.

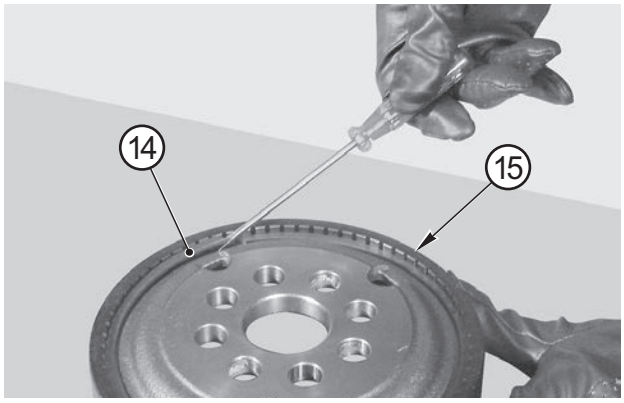


FIGURE 11: Remove the snap ring (14) from the crown (15).

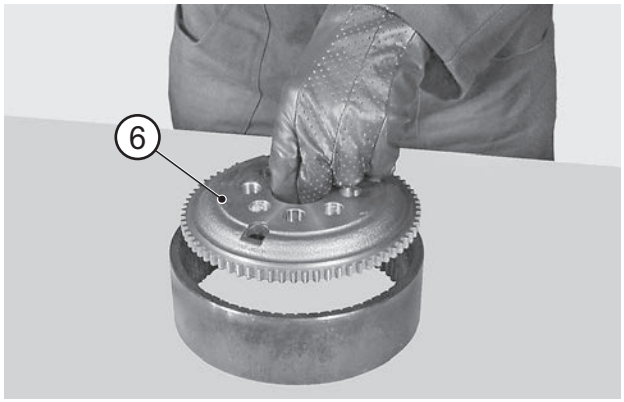


FIGURE 12: Remove the crown flange (6).

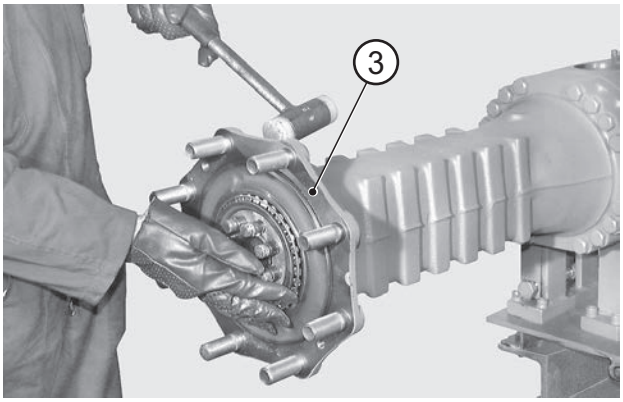


FIGURE 13: Partially extract the hub (3) using a plastic hammer.

NOTE:

Tap on alternate sides to loosen hub.

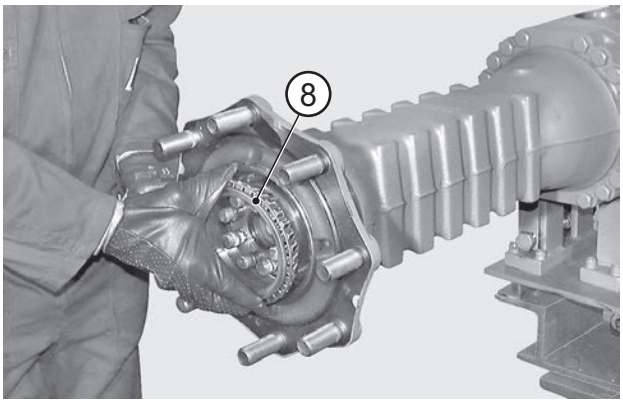


FIGURE 14: Remove the external bearing (8).

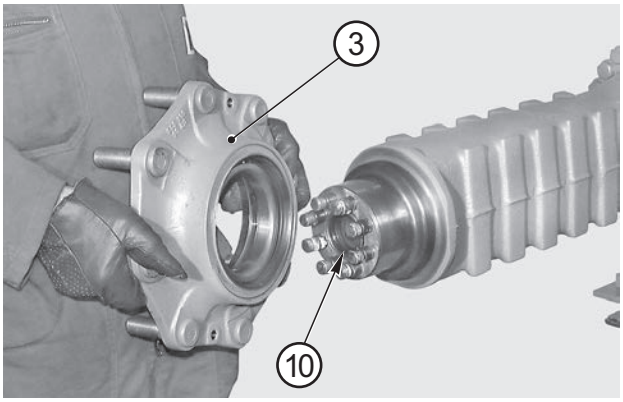


FIGURE 15: Extract the hub (3).

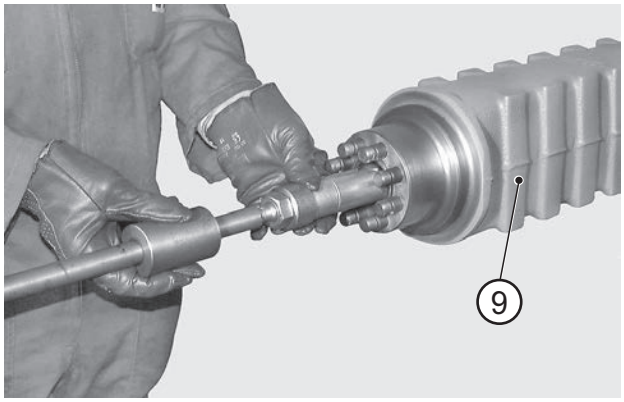


FIGURE 16: Remove snap ring (10) from the arm (9).

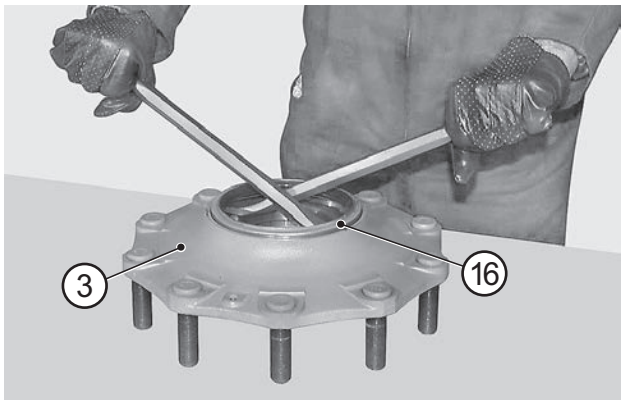


FIGURE 17: Remove the sealing ring (16) from the hub (3).

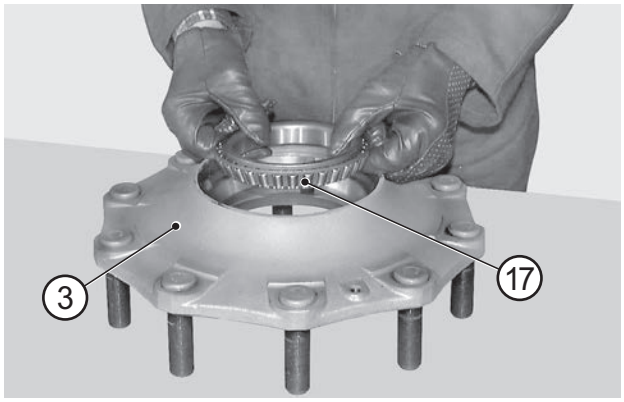


FIGURE 18: Remove the internal bearing (15).

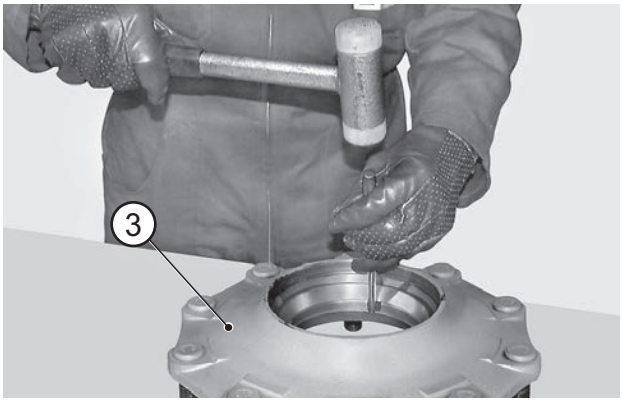


FIGURE 19: Remove the external thrust blocks from the bearings (8) and (17) force a pin-driver into the appropriate slots on the hub (3).

NOTE:

Hammer in an alternate way so as to avoid clamping or deformation of the thrust blocks.

ASSEMBLY

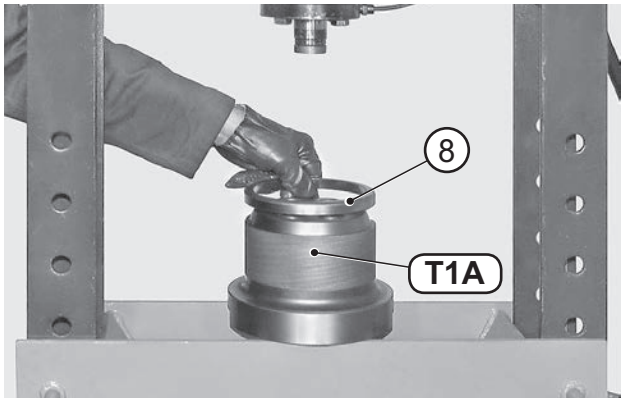


FIGURE 20: Position the lower part of tool T1A (See drawing T1 p. 34) and the thrust block of the external bearing (8) under the press.

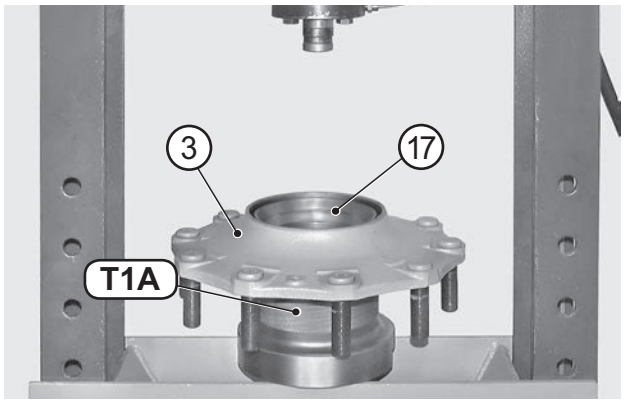


FIGURE 21: Lubricate the seats of the bearings and position the hub (3) on tool T1A (See drawing T1 p. 34); position the thrust block of the internal bearing (17).

NOTE:

Check that the thrust block is correctly oriented.

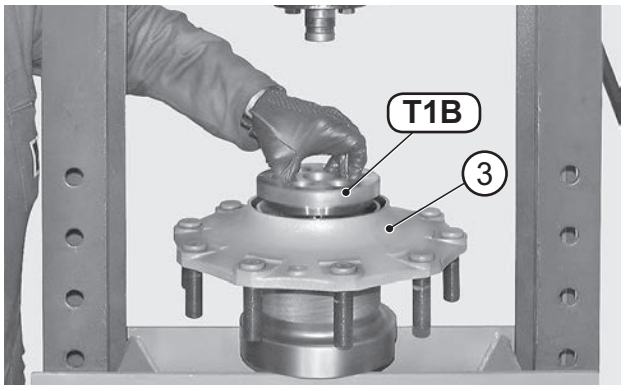


FIGURE 22: Position the upper part of tool T1B (See drawing T1 p. 34) and press the thrust blocks into the hub (3) all the way down.

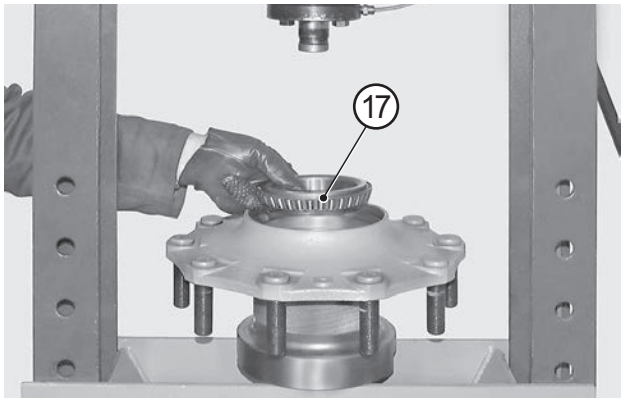


FIGURE 23: Fit the bearing (15) into the internal thrust block.

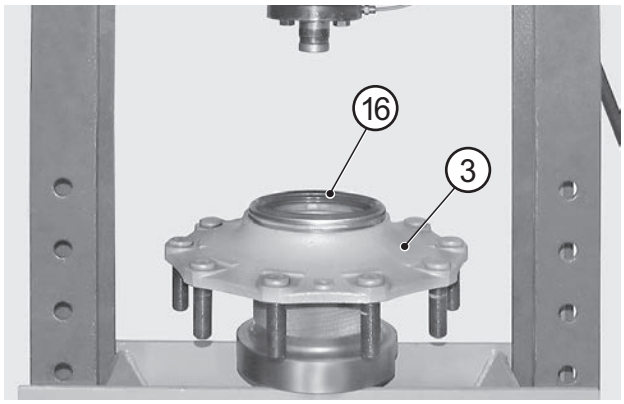


FIGURE 24: Apply a sealant for removable seals to the outer surface of the sealing ring (16). Position the sealing ring (16) in the hub (3).

NOTE:

Check that the ring (16) is correctly oriented.

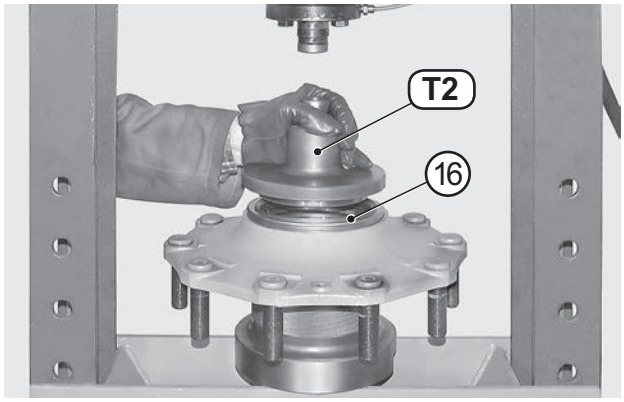


FIGURE 25: Position tool T2 (See drawing T2 p. 35) and press the sealing ring (16) into its seat.

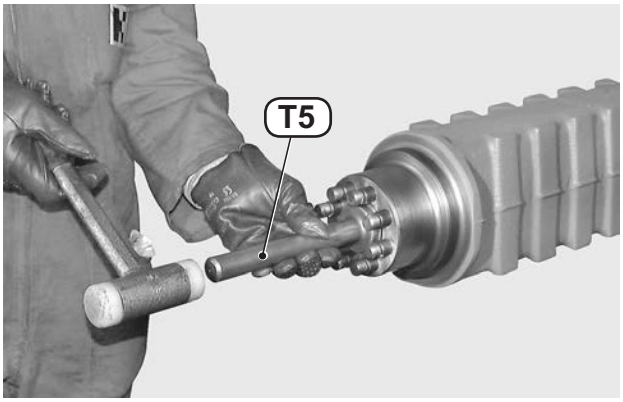


FIGURE 26: Lubricate the outer face of the sealing ring (10) and, with the help of tool T5 (See drawing T5 p. 36), fit it in the arm.

NOTE:

Accurately check direction of assembly.

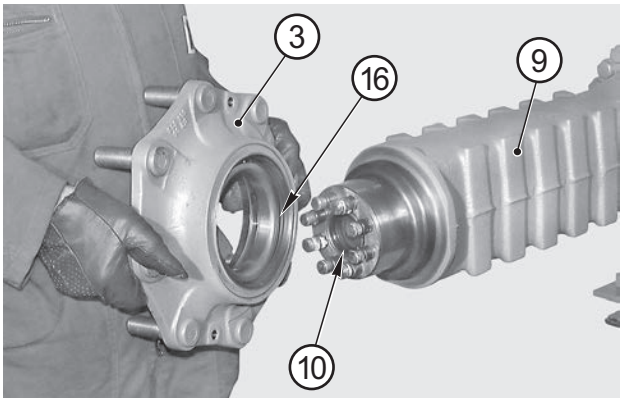


FIGURE 27: Lubricate with grease the sealing ring (16) and the hub of the arm (9).
Install the hub (3).

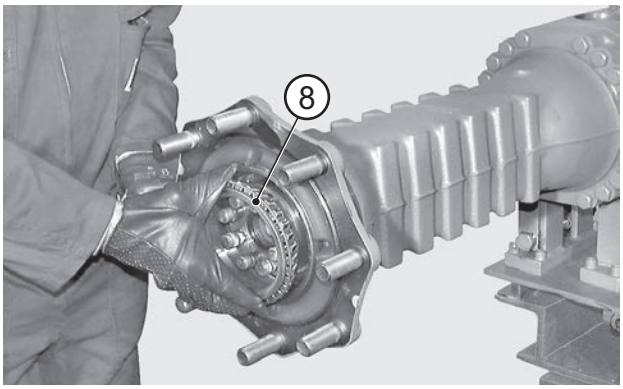


FIGURE 28: Install the external bearing (8).

NOTE:

Using a plastic hammer, drive the bearing to the limit stop by lightly hammering around the edge.

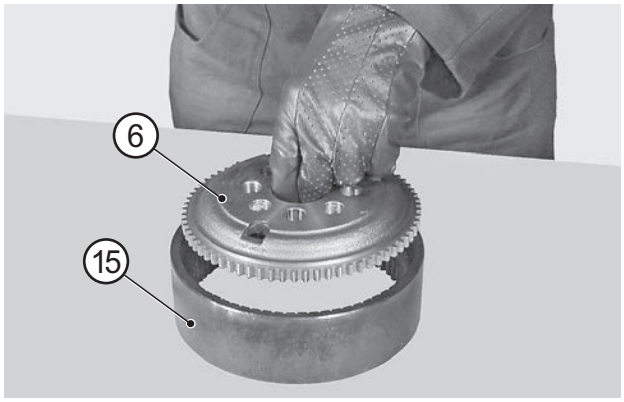


FIGURE 29: Insert the flange (6) in the crown (15).

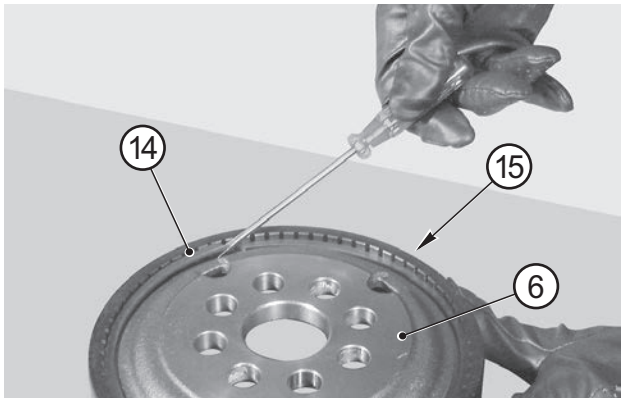


FIGURE 30: Insert the snap ring (14) in order to fix the flange (6) in the crown (15).

NOTE:

Carefully check that ring (14) is properly inserted in the slot of the crown (15).

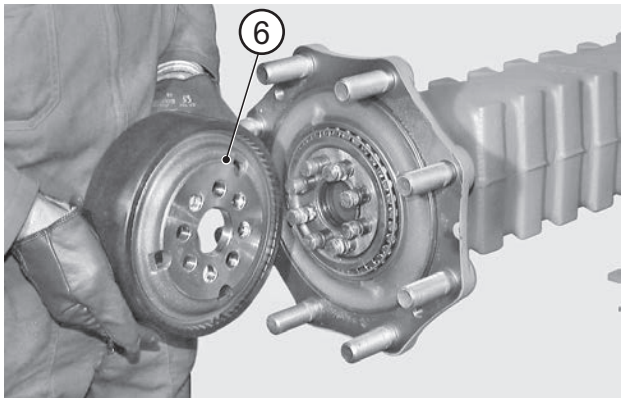


FIGURE 31: Fit the complete crown flange (6).

NOTE:

In order to fasten the flange (6), use a plastic hammer and alternately hammer on several equidistant points.

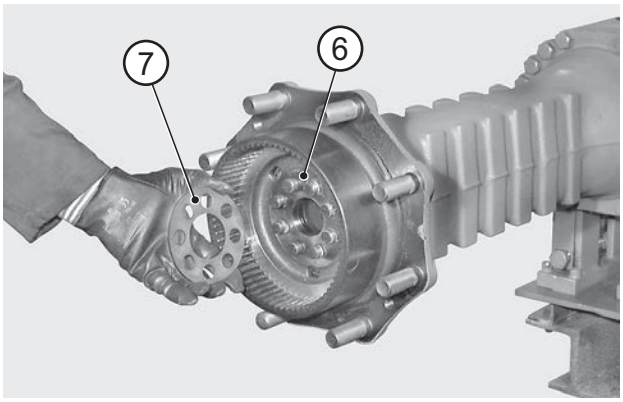


FIGURE 32: Apply Tecnolube Seal 101 grease to the surface of the safety flange (7) which touches the crown flange (6). Fit the safety flange (7).

FIGURE 33: Apply Loctite 242 to the studs and fit in the nuts (5).

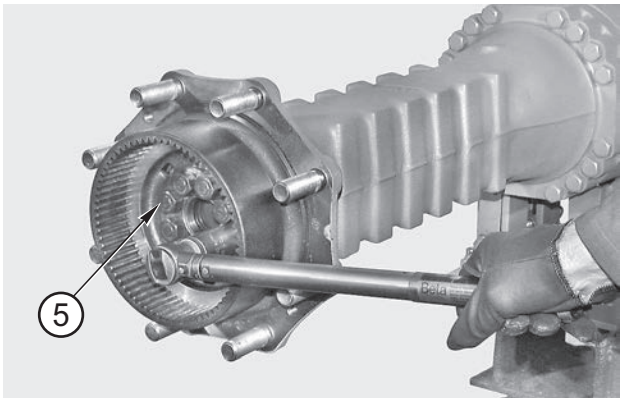


FIGURE 34: Cross tighten the nuts (5) in two stages.
Initial torque wrench setting: 130 N·m
Final torque wrench setting: 255 - 285 N·m

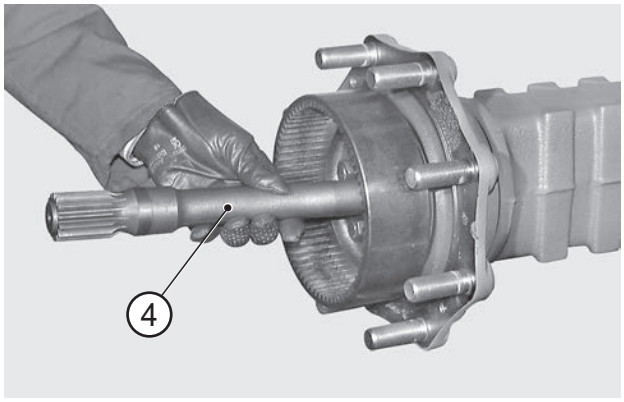


FIGURE 35: Grease snap ring (10) and sealing face of axle-shaft (4).
Install the axle shaft (4) making sure it is properly engaged in the braking disks and in the differential unit.

NOTE:

Be very careful not to damage the snap ring (10).

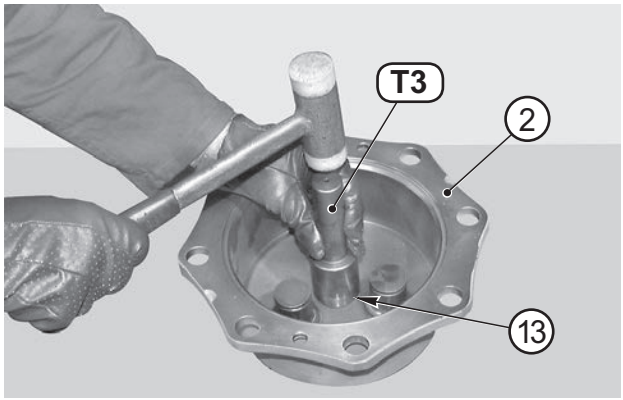


FIGURE 36: Using tool T3 (See drawing T3 p. 35), fit shim washer (13) into planetary cover (2).

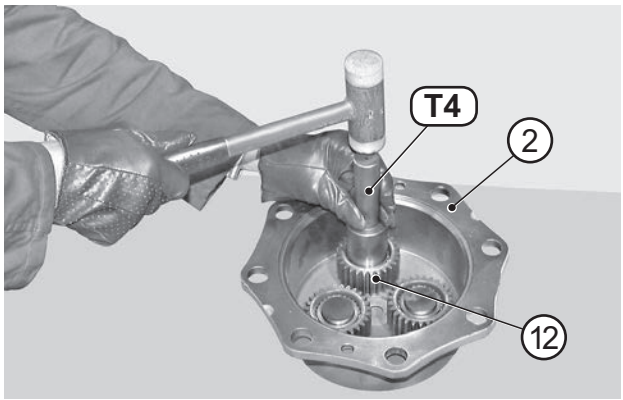


FIGURE 37: With the help of tool T4 (See drawing T4 p. 36), insert the planetary wheel gears (12) into the cover (2). Accurately check the orientation.

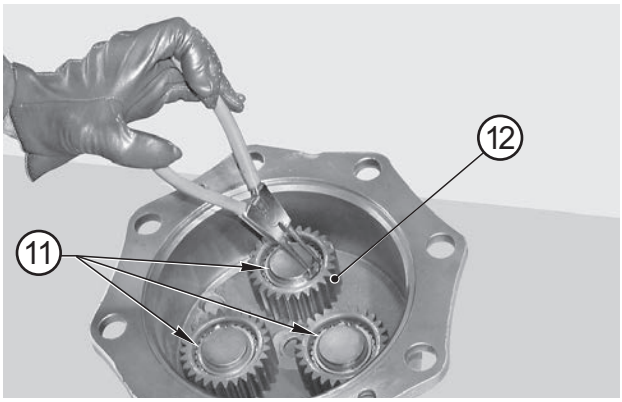


FIGURE 38: Lock the gears (12) into position by fitting the snap rings (11).

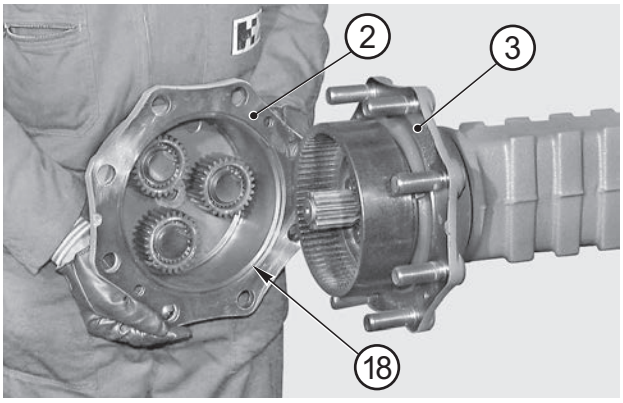


FIGURE 39: Fit the planetary carrier cover (2) onto the hub (3).

⚠CAUTION

Check that the o-ring (18) is in good condition and in position.

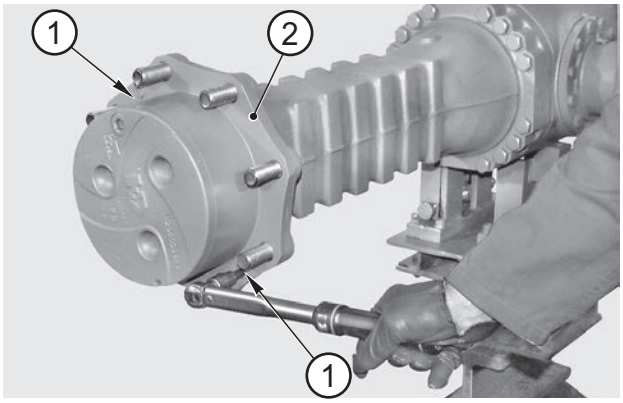
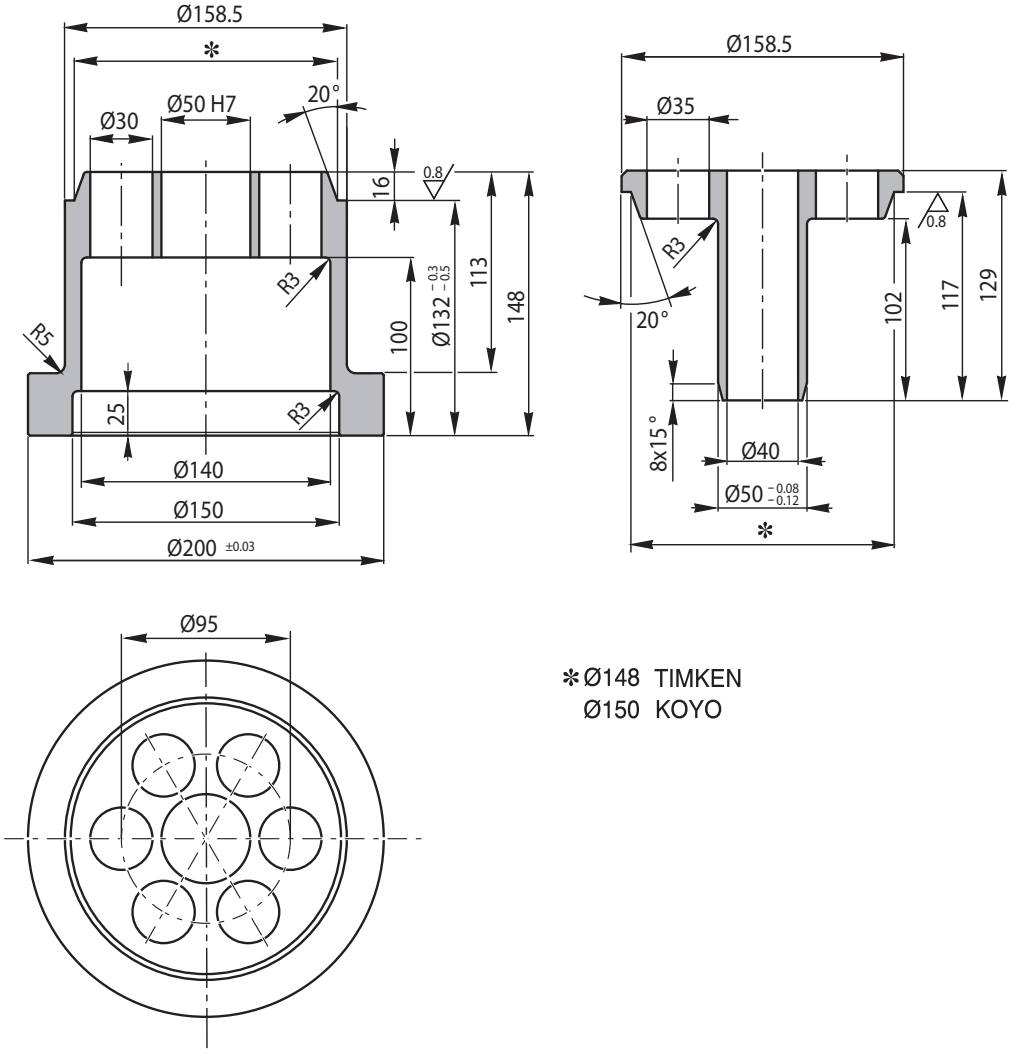


FIGURE 40: Lock the planetary carrier cover (2) by tightening the screws (1).
Torque wrench setting for screws: 40 - 50 N·m

SPECIAL TOOLS

T1

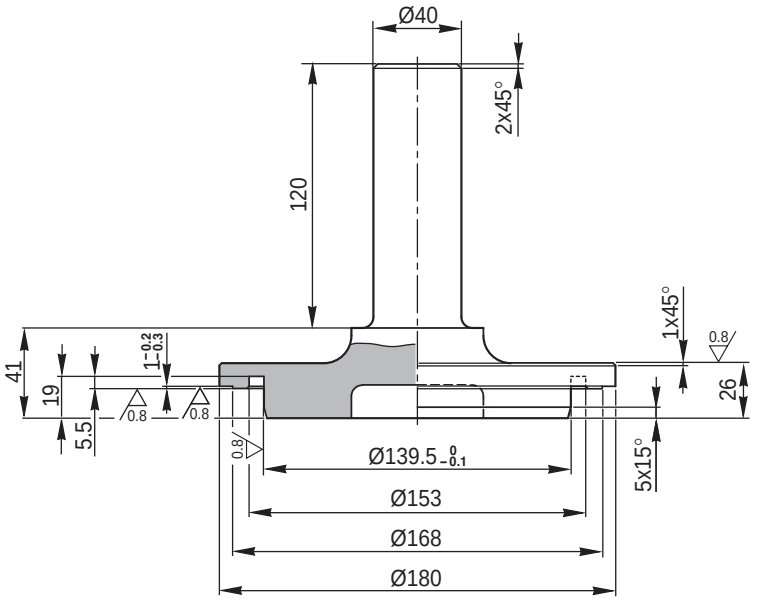
P/N: 3354



*Ø148 TIMKEN
Ø150 KOYO

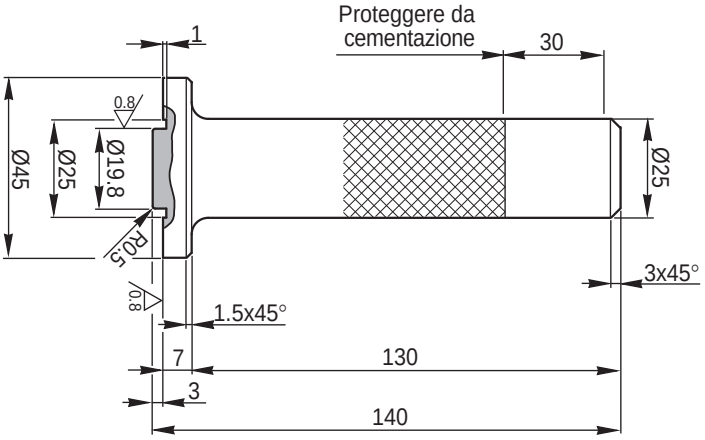
T2

P/N: 3502



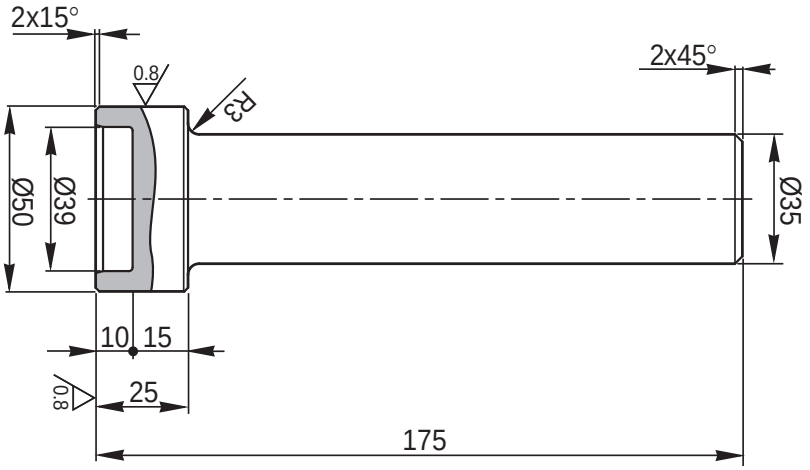
T3

P/N: 2321



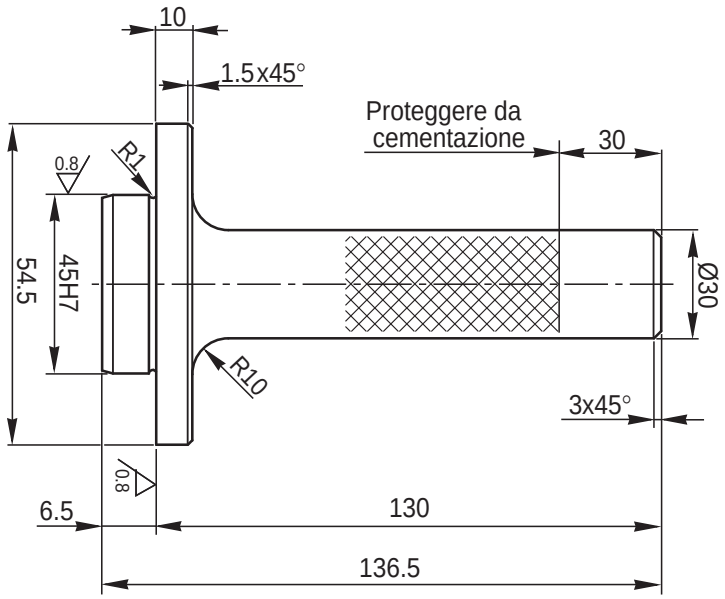
T4

P/N: 2304



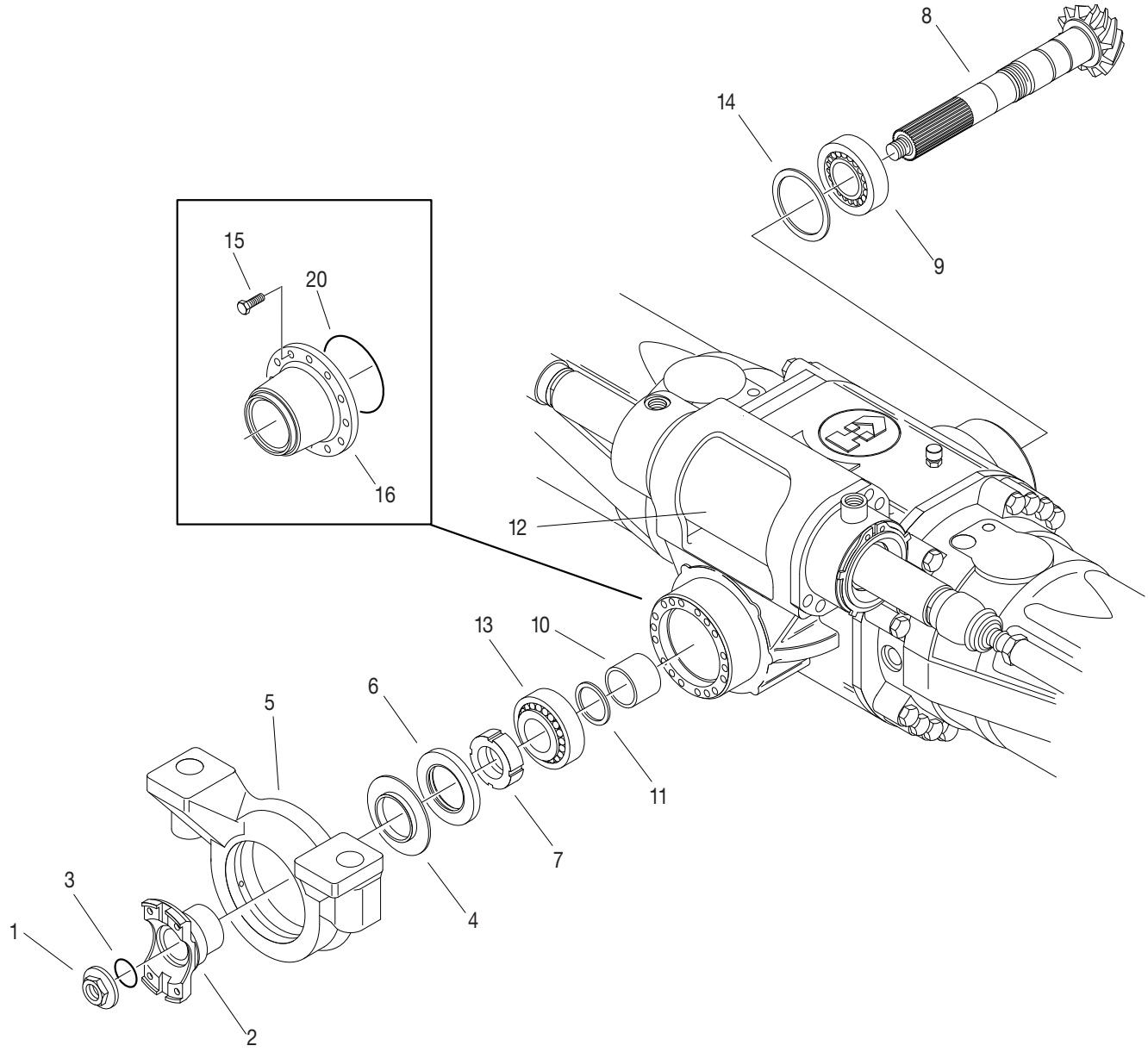
T5

P/N: 2322



BEVEL PINION

EXPLODED VIEW



DISASSEMBLY

⚠CAUTION

Before draining oil, release the internal pressure, for details see OIL DRAINING MANDATORY PROCEDURE p. 14.

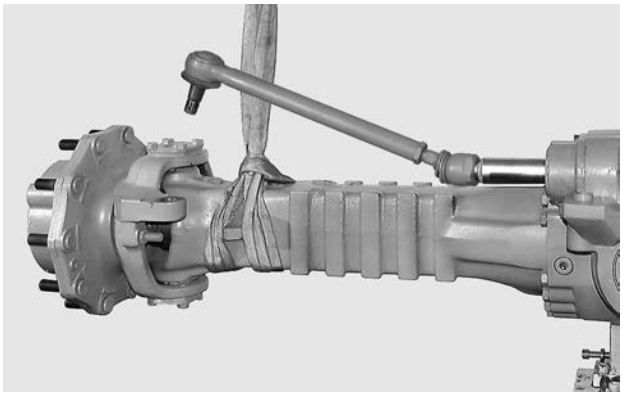


FIGURE 1: Remove the complete arms and the differential unit. For details, see CHECKING WEAR AND REPLACING THE BRAKING DISCS p. 19 and DIFFERENTIAL UNIT p. 55.

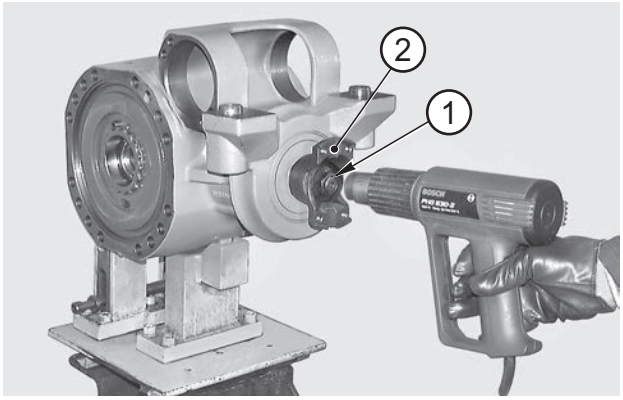


FIGURE 2: If disassembly is awkward, heat the check nut (1) of the flange (2) at 80°C.

NOTE:

Heating is meant to loosen the setting of Loctite on the nut (1).

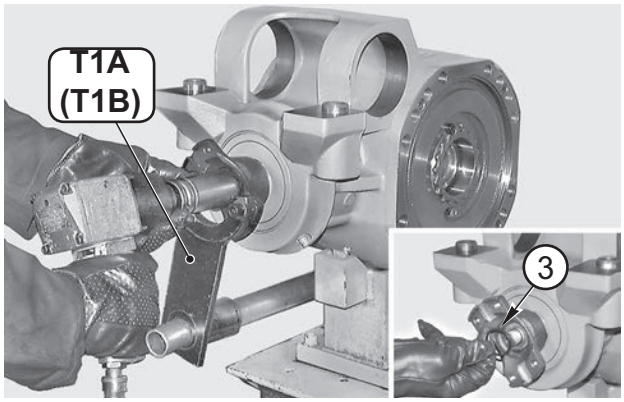


FIGURE 3: Position tool T1A (See drawing T1 p. 48) (or T1B), so as to avoid pinion rotation.
Loosen and remove the nut (1); also remove the o-ring (3).

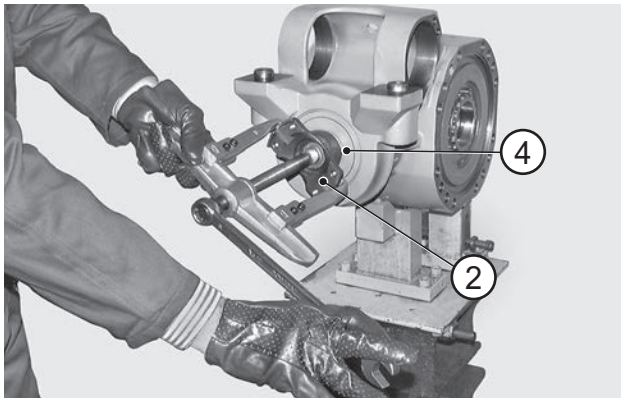


FIGURE 4: Remove the flange (2) complete with guard (4) by means of a puller.

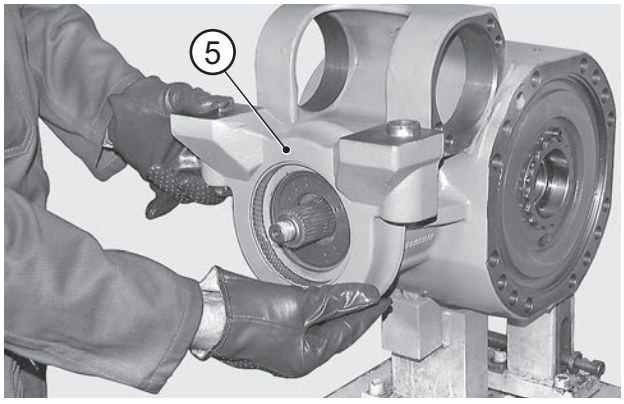


FIGURE 5: Remove the swinging support (5).

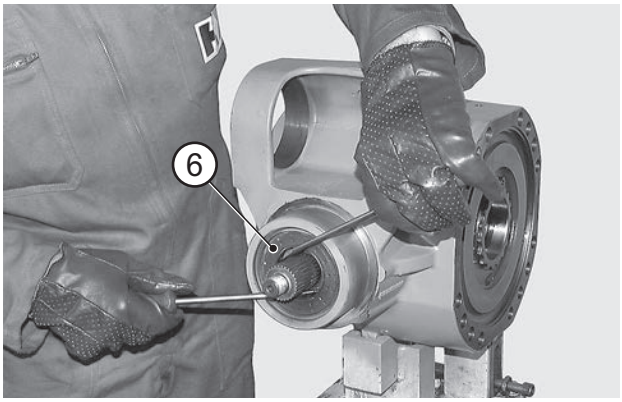


FIGURE 6: Remove the sealing ring (6).

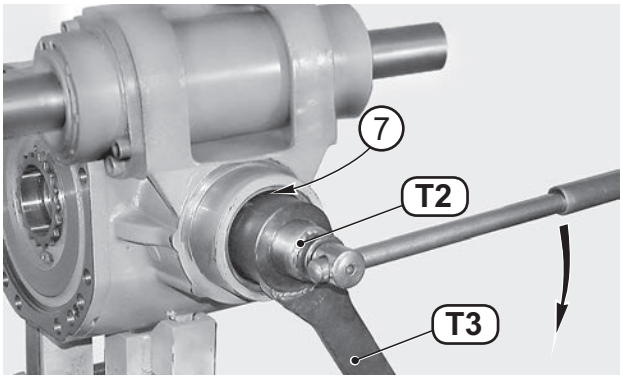


FIGURE 7: Position wrench T3 (See drawing T3 p. 49) onto the ring nut (7) and apply bar hold T2 (See drawing T2 p. 49) to the pinion (8).
Stop wrench T3 (See drawing T3 p. 49) and rotate the pinion so as to release and remove the ring nut (7).

NOTE:

If disassembly proves awkward, heat the ring nut to approximately 80°C.

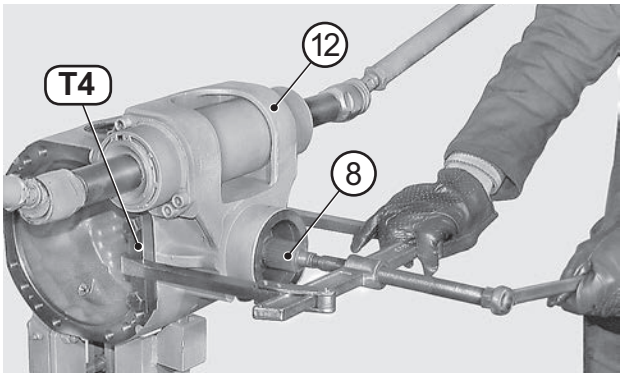


FIGURE 8: Apply blocks T4 (See drawing T4 p. 50) and, with the help of a puller, extract the pinion (8) complete with the internal bearing (9), the spacer (10) and shims (11).

NOTE:

The thrust blocks of the bearings remain in the central body (12).

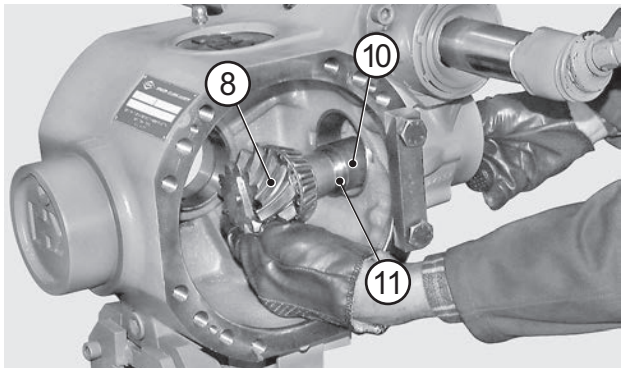


FIGURE 9: Remove the pinion (8), shims (11) and spacer (10).

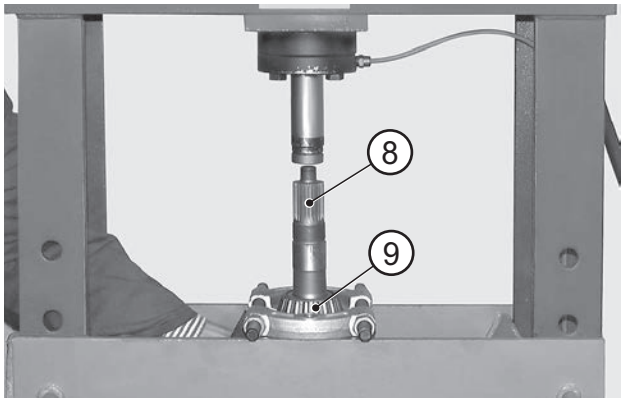


FIGURE 10: Using a puller and a press, remove the inner bearing (9) from the pinion (8).

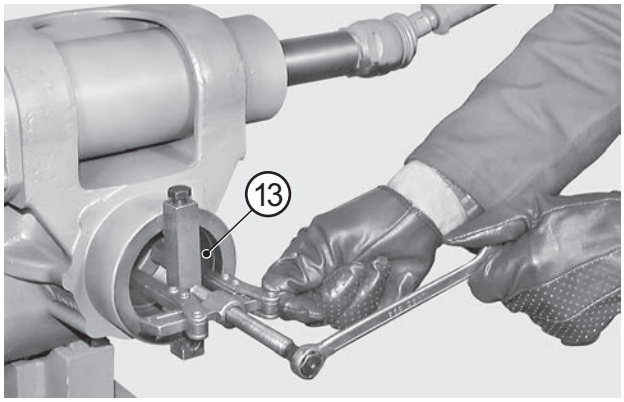


FIGURE 11: Remove the thrust block of the external bearing (13).

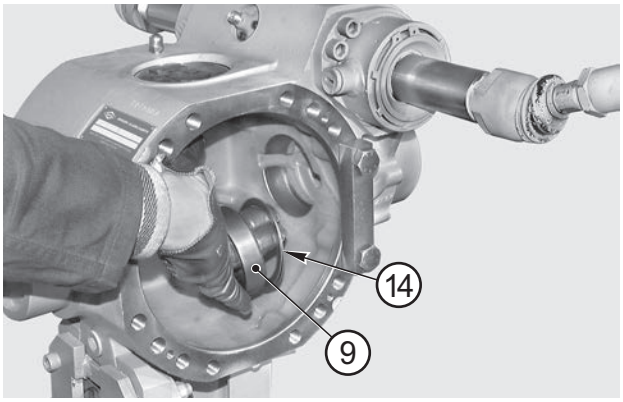


FIGURE 12: Insert a drift in the appropriate holes and remove the thrust block of the internal bearing (9) as well as the shim washers (14).

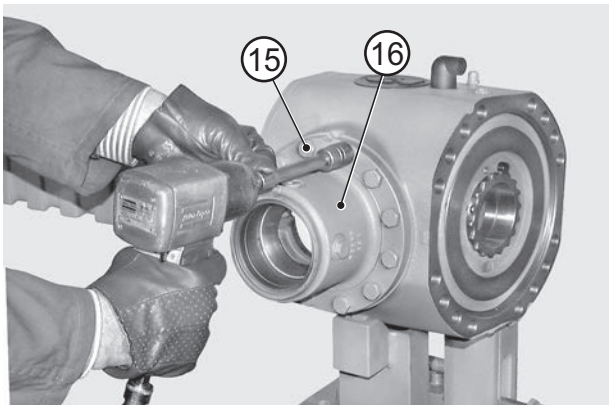


FIGURE 13: ONLY IF NECESSARY
Loosen and remove the screws (15) locking the support (16). Remove the whole support.

ASSEMBLY

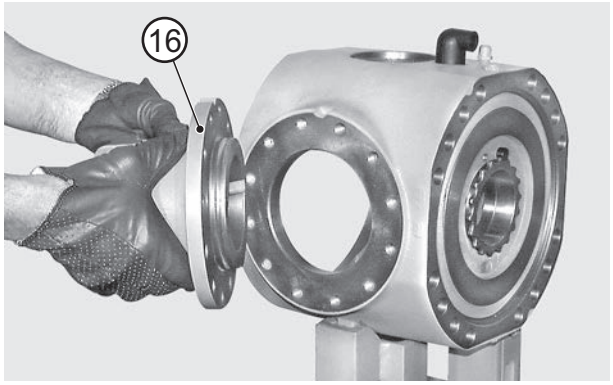


FIGURE 14: ONLY IF HAS BEEN REMOVED
Fit support (16), including o-ring (20), onto the intermediate body.

NOTE:

The cavity located on the outer diameter must face upwards.
Check and lubricate the o-ring (20).

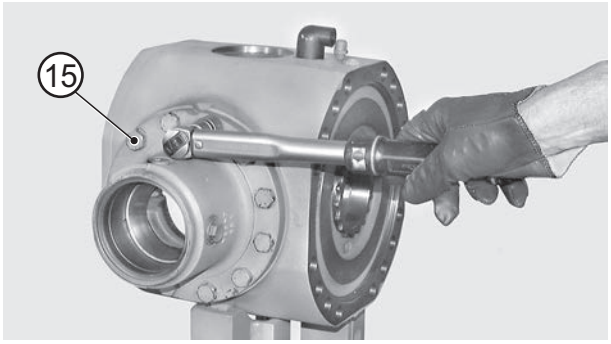


FIGURE 15: Fasten support with screws (15) previously coated with Loctite 270.
Tighten using the criss-cross method to a tightening torque of 90 - 100 N·m.

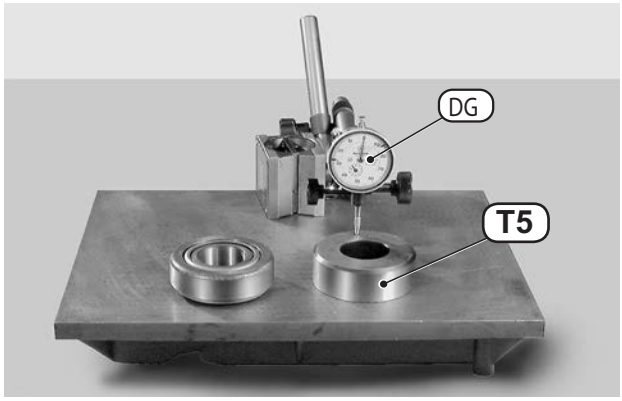


FIGURE 16: Using a surface plate, reset a dial indicator "DG" and place it on the measurement ring T5 (See drawing T5 p. 50) (with a thickness of 30.2 mm).
Preset the dial indicator to approximately 2 mm.

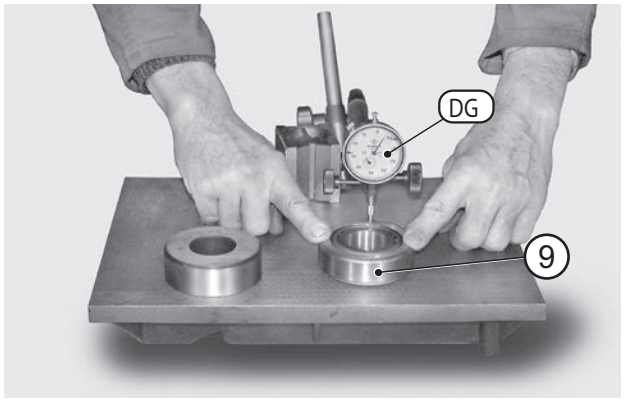


FIGURE 17: Bring the internal bearing (9), complete with its thrust block, under dial indicator.
Determine overall thickness "D" of the bearing checking the discrepancy between this size and the size of the measurement ring.

⚠CAUTION

Press the thrust block in the center and take several measurements while rotating the thrust block.

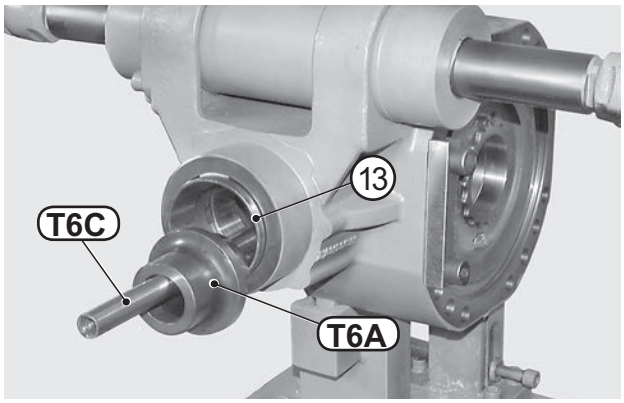


FIGURE 18: Partially insert the thrust block of the external bearing (13).

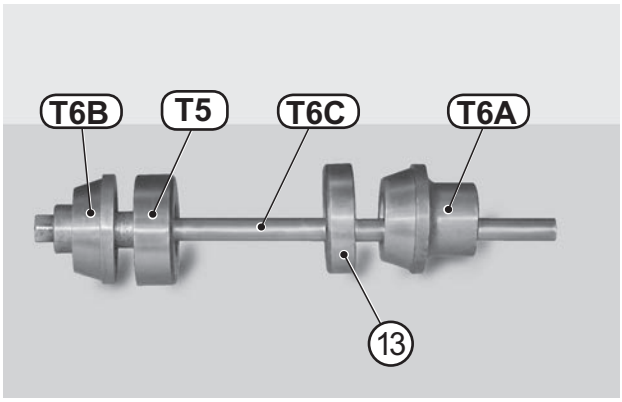


FIGURE 19: Install tension rod T6C (See drawing T6 p. 51), measurement ring T5 (See drawing T5 p. 50) and front guide tool T6A (See drawing T6 p. 51) on the thrust block of the external bearing (13).

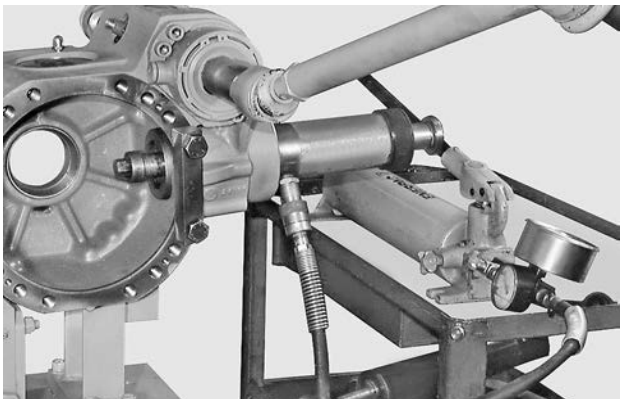


FIGURE 20: Connect the tension rod to the press and move the thrust block of the external bearing (13) into its seat. Disconnect the press and remove the tension rod.

NOTE:

Before starting the next stage, make sure that the thrust block has been completely inserted into its seat.

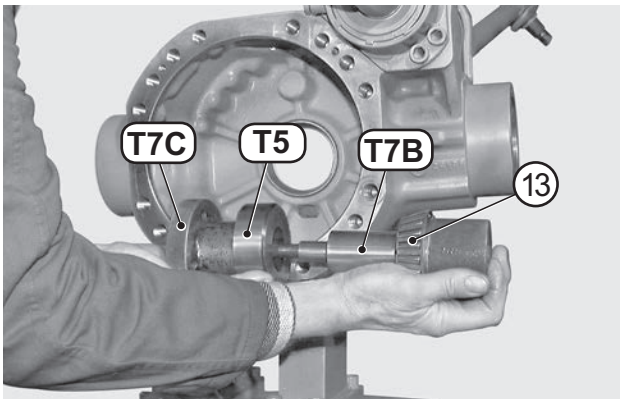


FIGURE 21: Insert tool T7B (See drawing T7 p. 52) complete with external bearing (13), measurement ring T5 (See drawing T5 p. 50) and gauged ring nut T7C (See drawing T7 p. 52). Manually tighten.

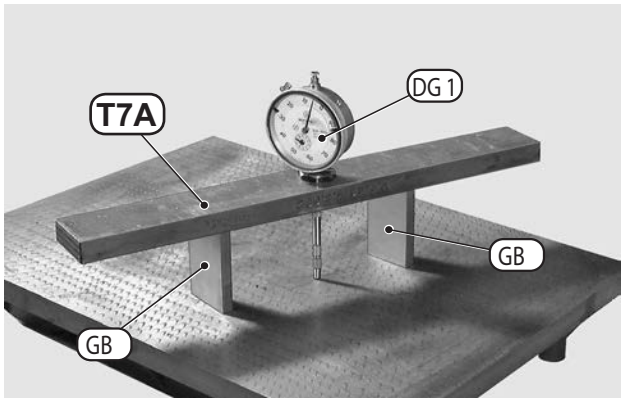


FIGURE 22: Fit a dial indicator "DG1" with long stem into bar T7A (See drawing T7 p. 52); when the bar rests on two size-blocks "GB" of 57 mm, reset the gauge.
Preset the gauge to approximately 2 mm and reset.

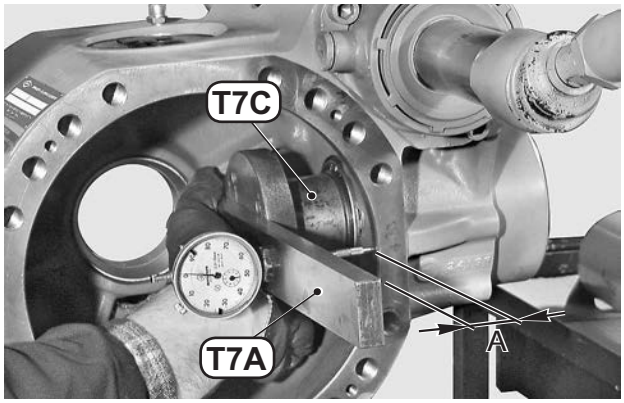


FIGURE 23: Lay bar T7A (See drawing T7 p. 52) on gauged nut T7C (See drawing T7 p. 52) and take the measurement "A" at about 57 mm corresponding to the maximum diameter of arms centring.

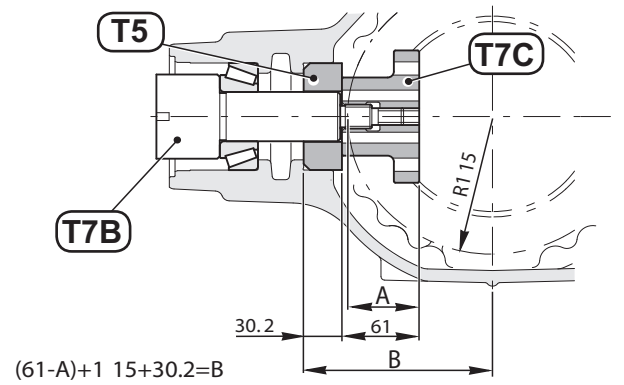


FIGURE 24: Calculate size "B" which will be the first useful value for calculating the size of the shims (14) that are to be inserted under the thrust block of the internal bearing (9).

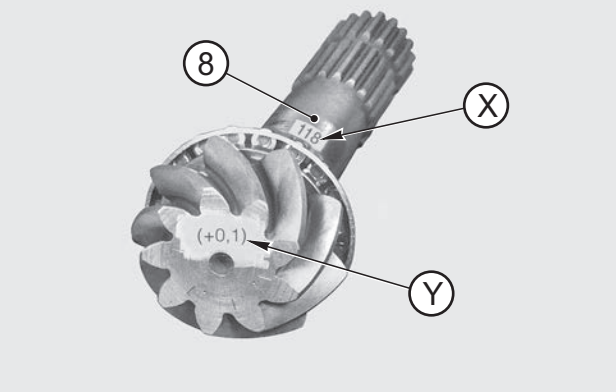


FIGURE 25: Check the nominal size (X) marked on the pinion and add or subtract the indicated variation (Y) so as to obtain size "Z".
e.g.: Z= 118 + 0.1 = 118.1
Z= 118 ± 0.2 = 117.8

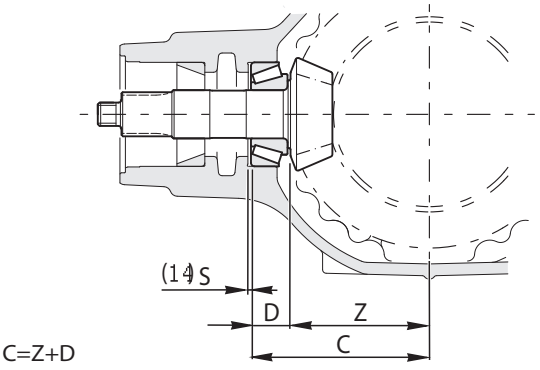


FIGURE 26: Calculate size "C" which represents the second value for calculating the size of the shims "S" that are to be placed under the thrust block of the internal bearing (9).

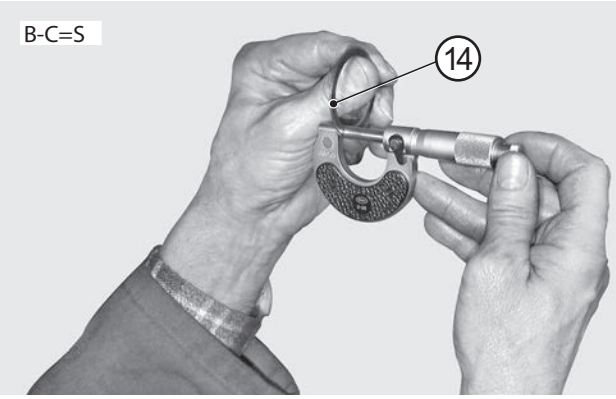


FIGURE 27: Calculate the difference between sizes "B" and "C" so as to obtain the size "S" of the shim (14) that will go under the thrust block of the internal bearing (9).

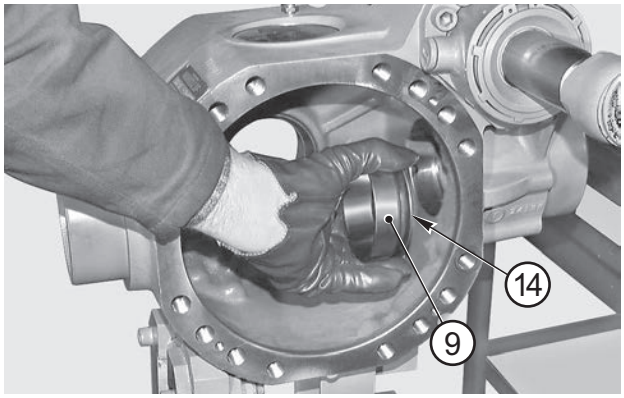


FIGURE 28: Insert shim "S" (14) and the thrust block of the internal bearing (9) in the central body.

NOTE:

To hold shim "S" (14) in position, apply grease.

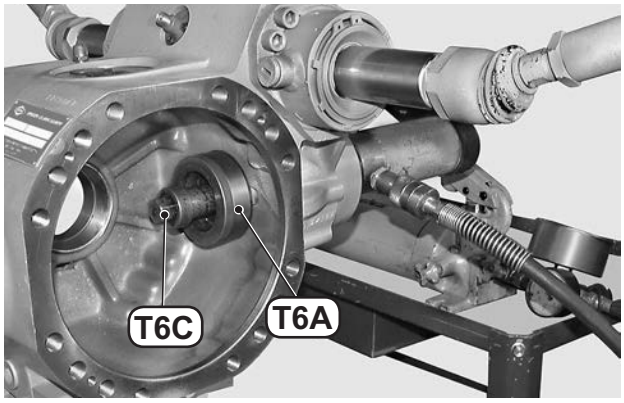


FIGURE 29: Position tool T6A (See drawing T6 p. 51) and tension rod T6C (See drawing T6 p. 51).
Connect the tension rod to the press, fasten the thrust block and then remove the tools.

NOTE:

Before going on to the next stage, make sure that the thrust block has been completely inserted.

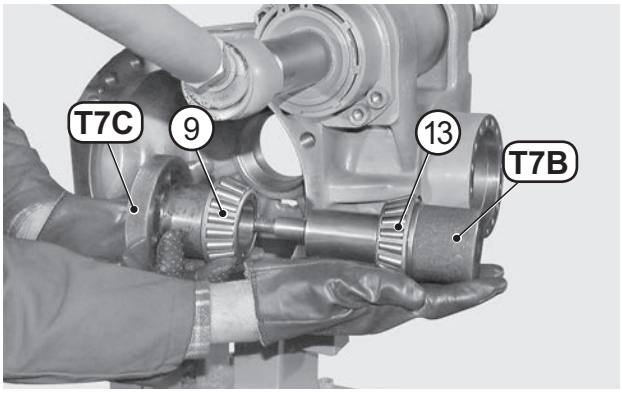


FIGURE 30: Position tools T7C (See drawing T7 p. 52) and T7B (See drawing T7 p. 52) complete with tapered bearings (9) and (13); manually tighten until a rolling torque has been obtained.

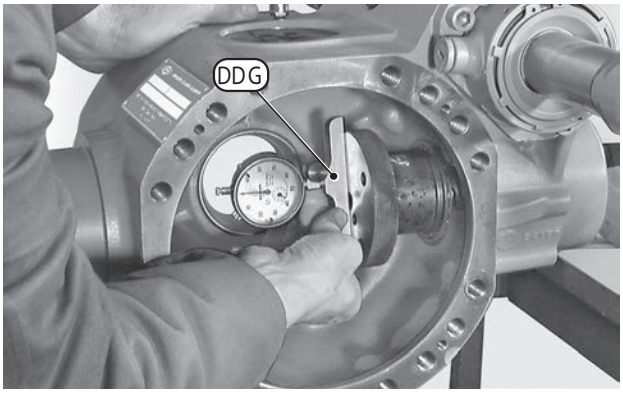


FIGURE 31: Insert the stem of a depth gauge "DDG" in either side hole of tool T7C (See drawing T7 p. 52); reset the gauge with a presetting of approximately 3 mm.

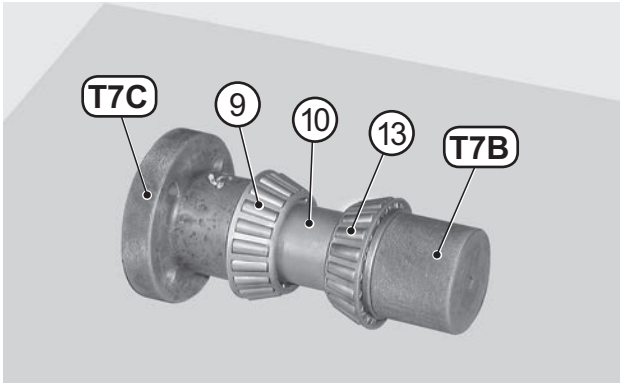


FIGURE 32: Remove the depth gauge and release tools and bearings from the central body.
Re-install all and insert the spacer (10) between bearings (9) and (13); manually tighten the whole pack.

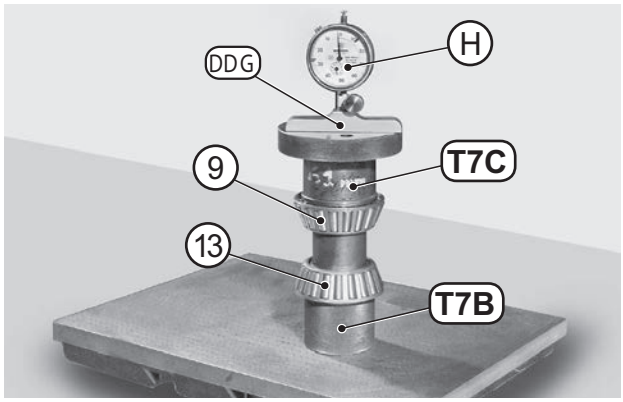


FIGURE 33: Insert depth gauge "DDG" into tool T7B (See drawing T7 p. 52) T7C (See drawing T7 p. 52) and measure variation "H" in relation to the zero setting performed back at figure 28.

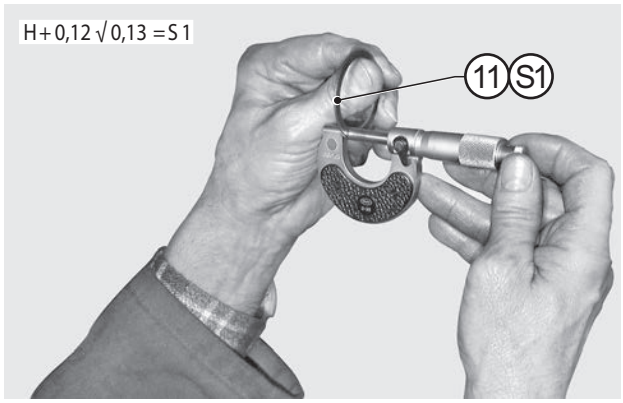


FIGURE 34: The variation is to be added to a set value of 0.12 - 0.13 mm., so as to obtain the size of shim "S1" (11) which will be inserted between the external bearing (13) and the spacer (10) and subsequently, to determine the preload for the bearings.

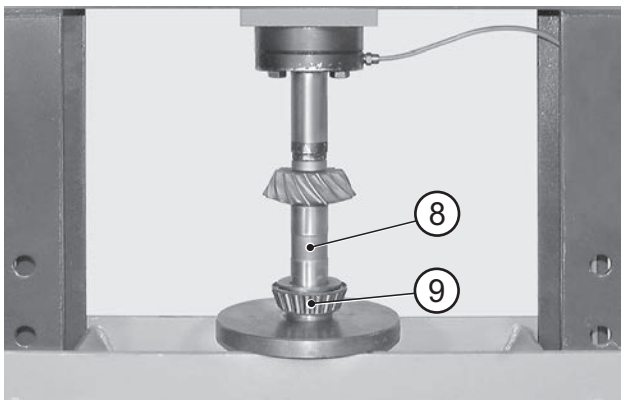


FIGURE 35: Position the internal bearing (9) and the pinion (8) under a press; force the bearing onto the pinion.

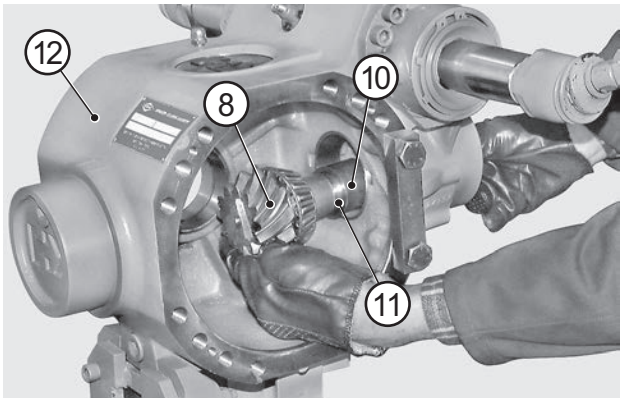


FIGURE 36: Fit the pinion (8), shim "S1" (11) and spacer (10) in the main body (12).

NOTE:

The thinner shims must be placed in-between the thicker ones

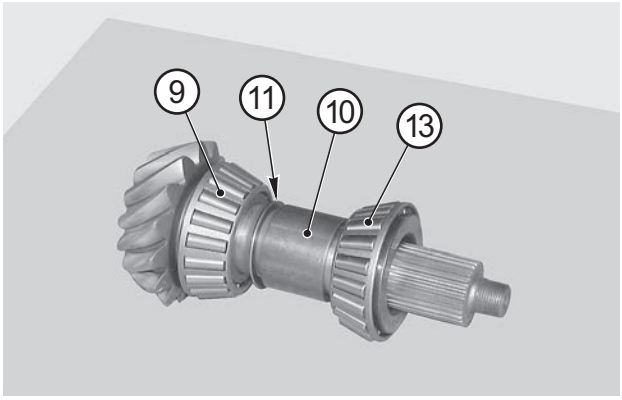


FIGURE 37: Insert the external bearing (13) in the central body in order to complete the pack arranged as in the figure.

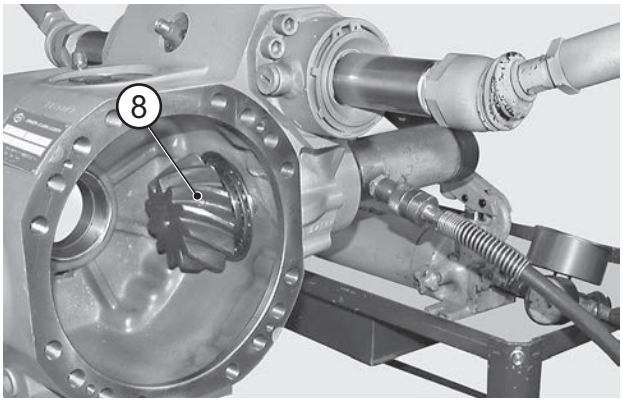


FIGURE 38: Connect the pinion (8) to the tie rod T8A (See drawing T8 p. 52) and T8B (See drawing T8 p. 52); connect the tie rod T8C (See drawing T8 p. 52) to the press and block.

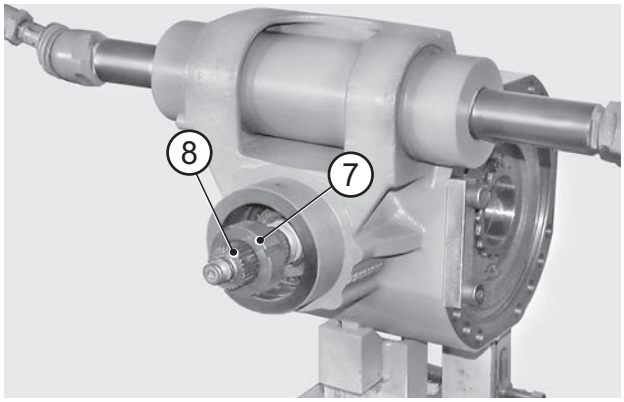


FIGURE 39: STANDARD INPUT FLANGE VERSION
Apply Loctite 242 to the thread of the ring nut (7) and screw the nut onto the pinion (8).

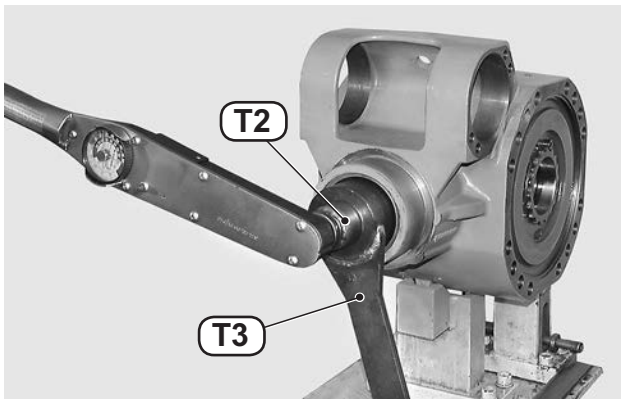


FIGURE 40: STANDARD INPUT FLANGE VERSION
Apply special wrench T3 (See drawing T3 p. 49) to the ring nut (7) and bar-hold T2 (See drawing T2 p. 49) to the pinion (8). Lock the wrench T3 (See drawing T3 p. 49) and rotate the pinion using a torque wrench, up to a minimum required torque setting of 500 N·m.

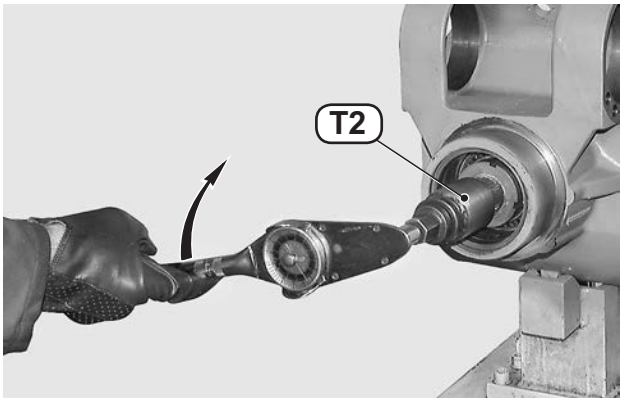


FIGURE 41: STANDARD INPUT FLANGE VERSION
Apply onto the pinion (8) the bar-hold and with the help of a torque wrench, check the torque of the pinion (8).
Torque: 120 - 200 Ncm

⚠CAUTION

STANDARD INPUT FLANGE VERSION
If torque exceeds the maximum value, then the size of shim "S1" (11) between the bearing (13) and the spacer (10) needs to be increased.

If torque does not reach the set value, increase the torque setting of the ring nut (7) in different stages to obtain a maximum value of 570 N·m.

If torque does not reach the minimum value, then the size of shim "S1" (11) needs to be reduced.

When calculating the increase or decrease in size of shim "S1", bear in mind that a variation of shim (11) of 0.01 mm corresponds to a variation of 60 Ncm in the torque of the pinion (8).

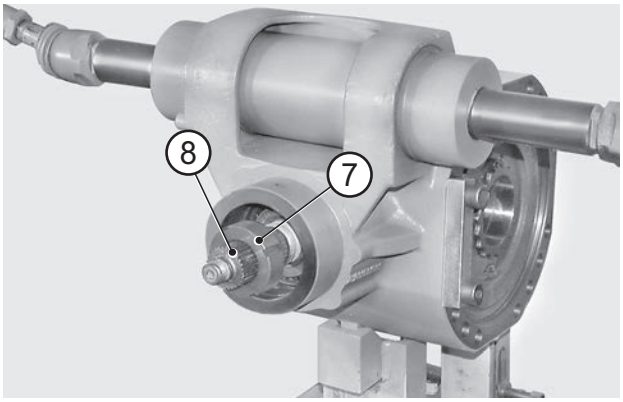


FIGURE 42: FLANGED GEARBOX VERSION
Apply Loctite 270 to the thread of the ring nut (7) and screw the nut onto the pinion (8).

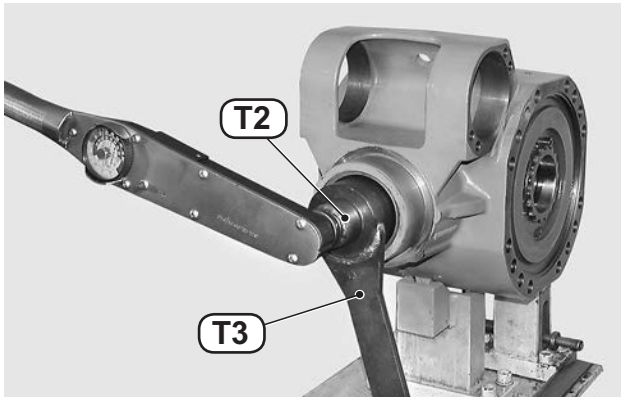


FIGURE 43: FLANGED GEARBOX VERSION
Apply special wrench T3 (See drawing T3 p. 49) to the ring nut (7) and bar-hold T2 (See drawing T2 p. 49) to the pinion (8). Lock the wrench T3 (See drawing T3 p. 49) and rotate the pinion using a torque wrench, up to a minimum required torque setting of 900 N·m.

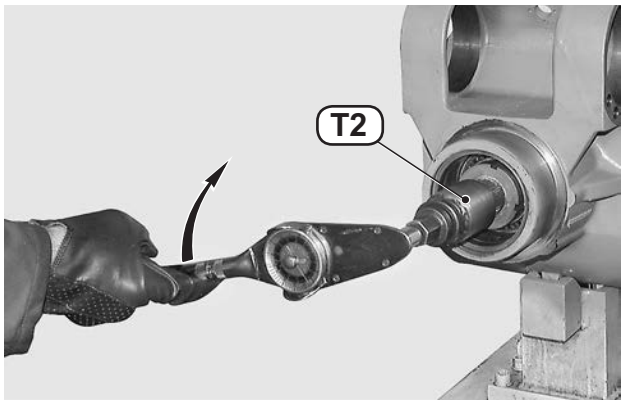


FIGURE 44: FLANGED GEARBOX VERSION
Apply onto the pinion (8) the bar-hold and with the help of a torque wrench, check the torque of the pinion (8).
Torque: 120 - 200 Ncm

⚠CAUTION

FLANGED GEARBOX VERSION
If torque exceeds the maximum value, then the size of shim "S1" (11) between the bearing (13) and the spacer (10) needs to be increased.

If torque does not reach the set value, increase the torque setting of the ring nut (7) in different stages to obtain a maximum value of 1000 N·m.

If torque does not reach the minimum value, then the size of shim "S1" (11) needs to be reduced.

When calculating the increase or decrease in size of shim "S1", bear in mind that a variation of shim (11) of 0.01 mm corresponds to a variation of 60 Ncm in the torque of the pinion (8).

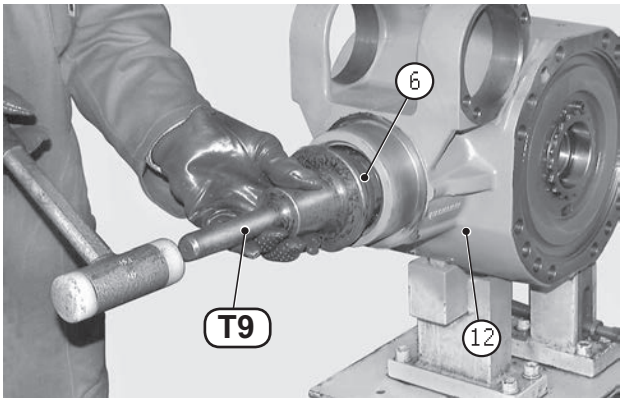


FIGURE 45: Lubricate the outer surface of the new sealing ring (6) and fit it onto the central body (12) using tool T9 (See drawing T9 p. 53).

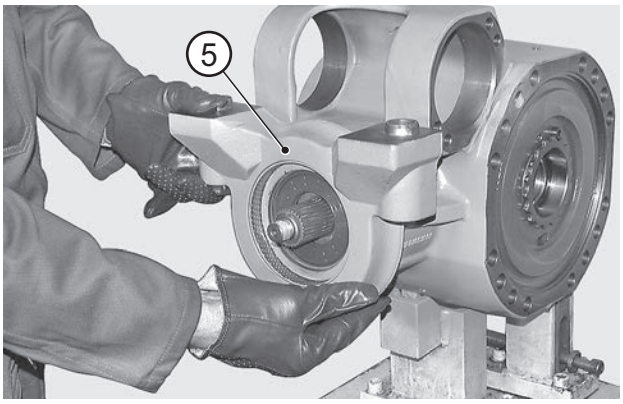


FIGURE 46: Install the swinging support (5).

NOTE:

Check that it is properly oriented.

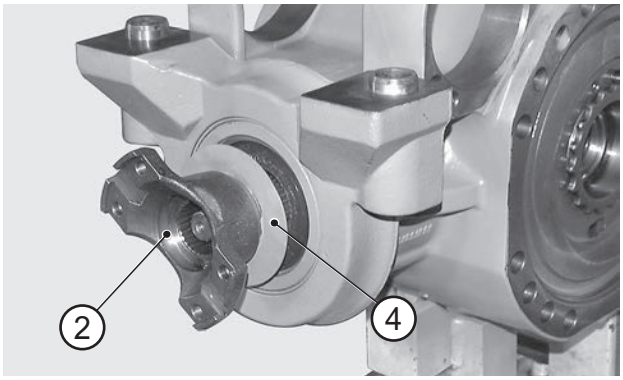


FIGURE 47: Fit the flange (2) complete with the guard (4) and fasten it. For seating the flange (2), use a plastic hammer if necessary.

NOTE:

Make sure that the guard (4) is securely fastened onto the flange and that it is not deformed.

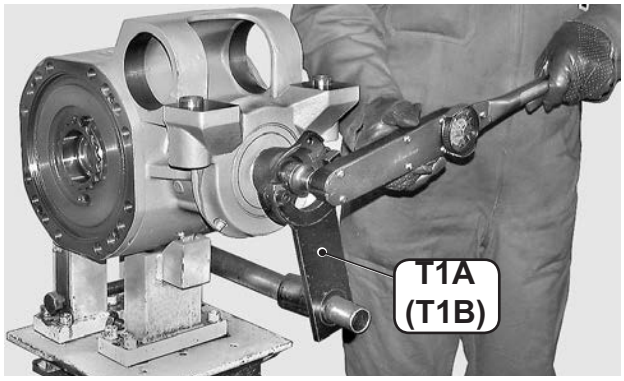


FIGURE 48: Apply Loctite 242 to the threaded part of the pinion (8). Position tool T1A (See drawing T1 p. 48) (or T1B) and fasten it in order to avoid rotation. Insert o-ring (3) the nut (1) and tighten it using a torque wrench.
Torque wrench setting: 280 - 310 N·m

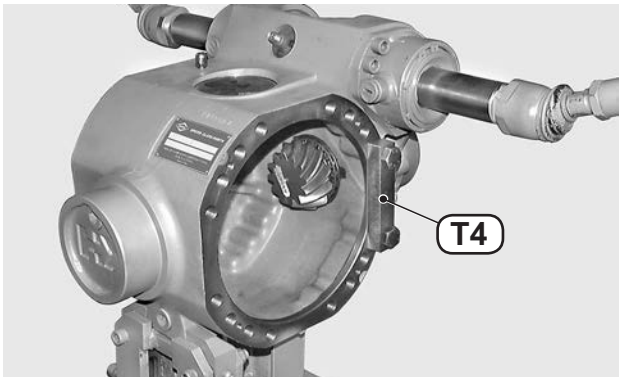
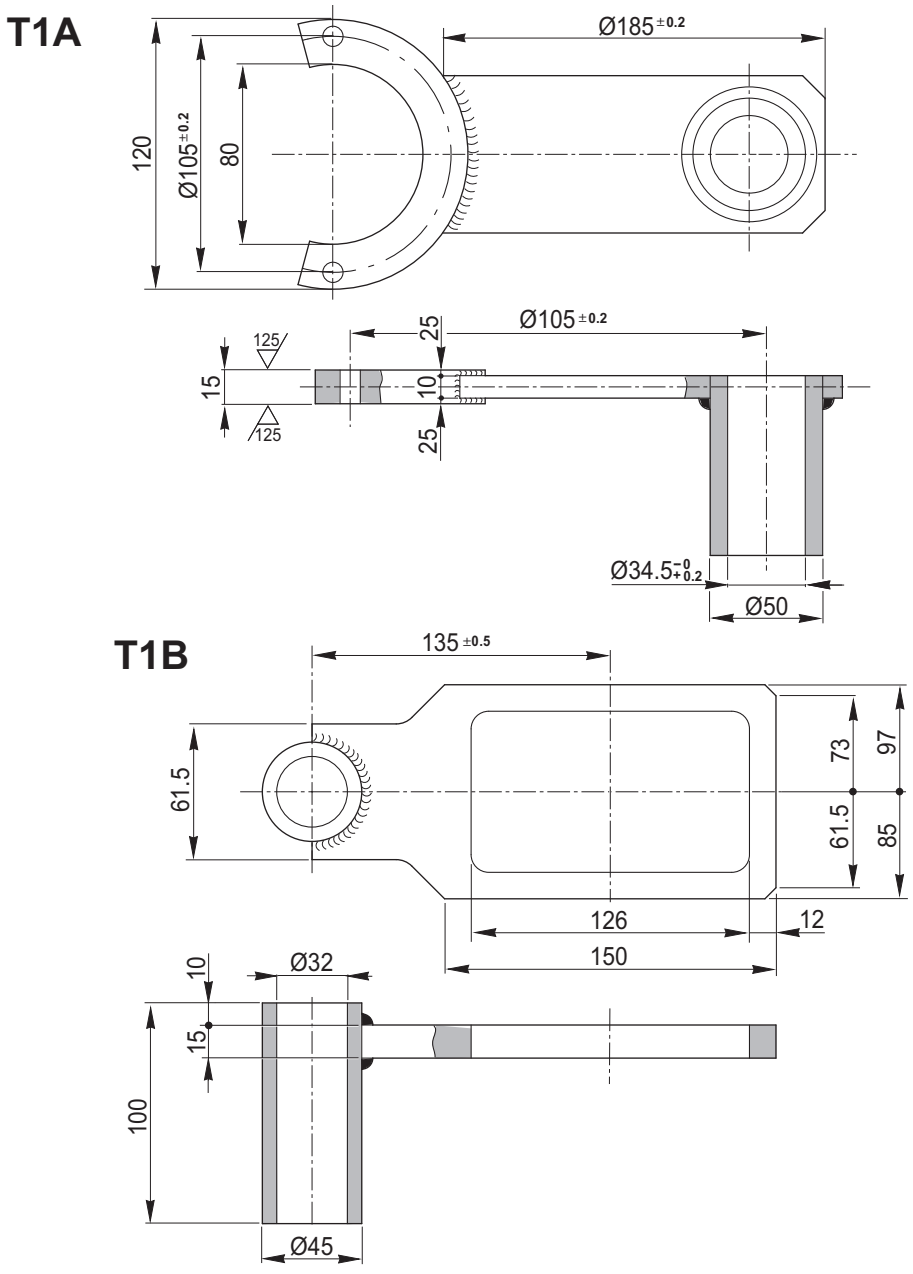


FIGURE 49: Remove blocks T4 (See drawing T4 p. 50) (used for extracting the pinion) and re-install the arms.
For details, see CHECKING WEAR AND REPLACING THE BRAKING DISCS p. 19.

SPECIAL TOOLS

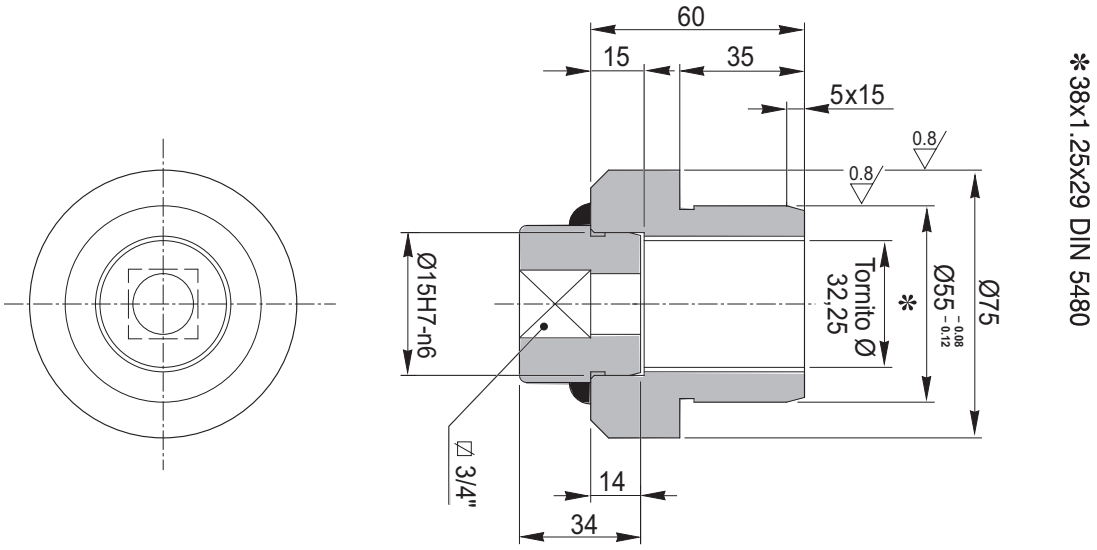
T1

P/N: 2308



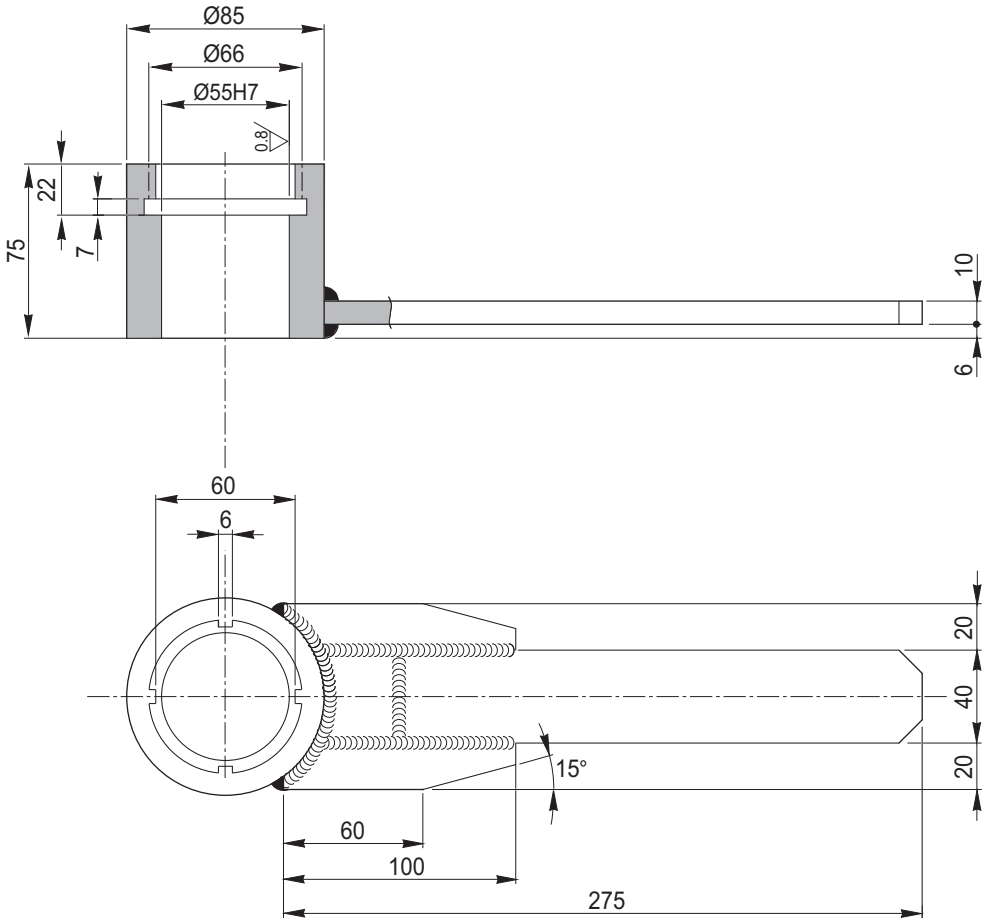
T2

P/N: 3317/3



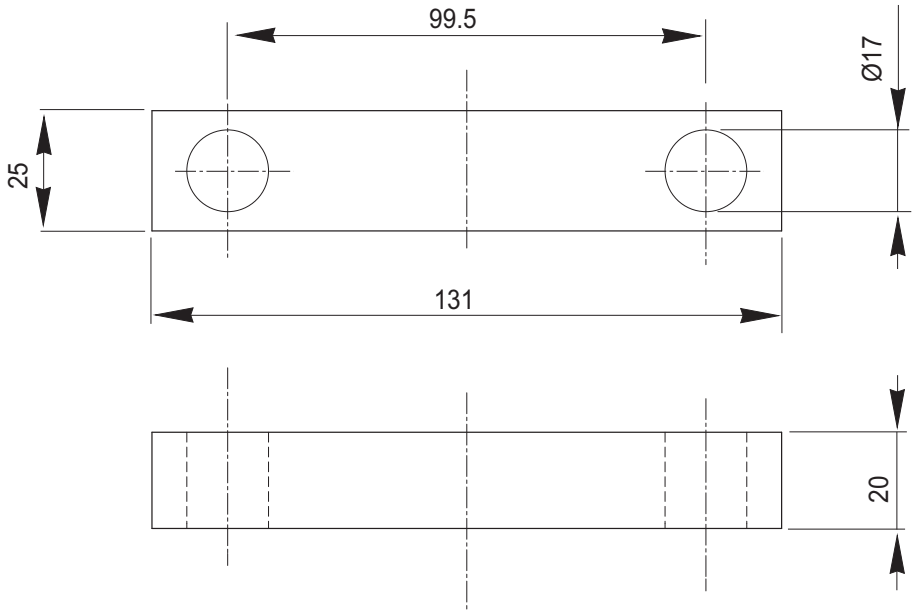
T3

P/N: 3317/A



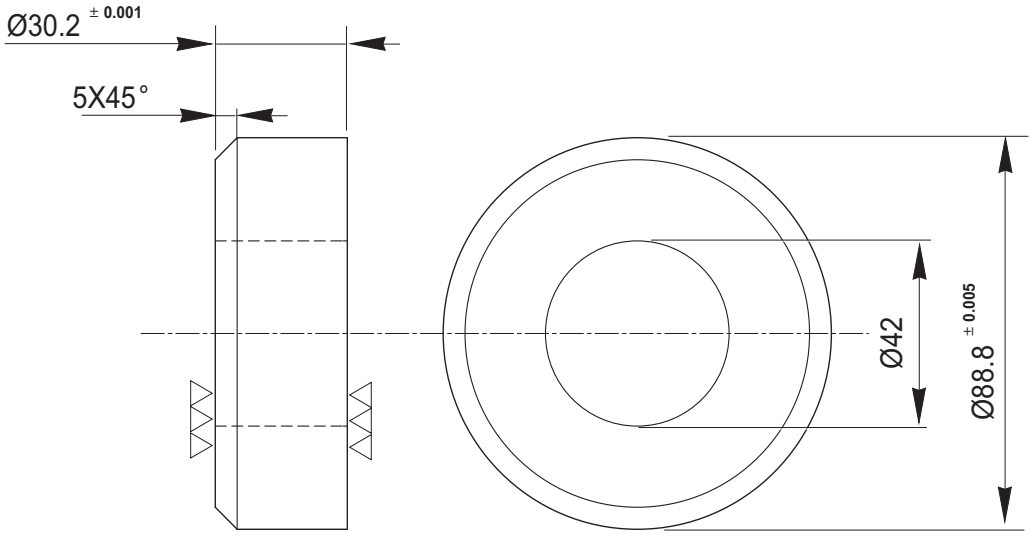
T4

P/N: 2309



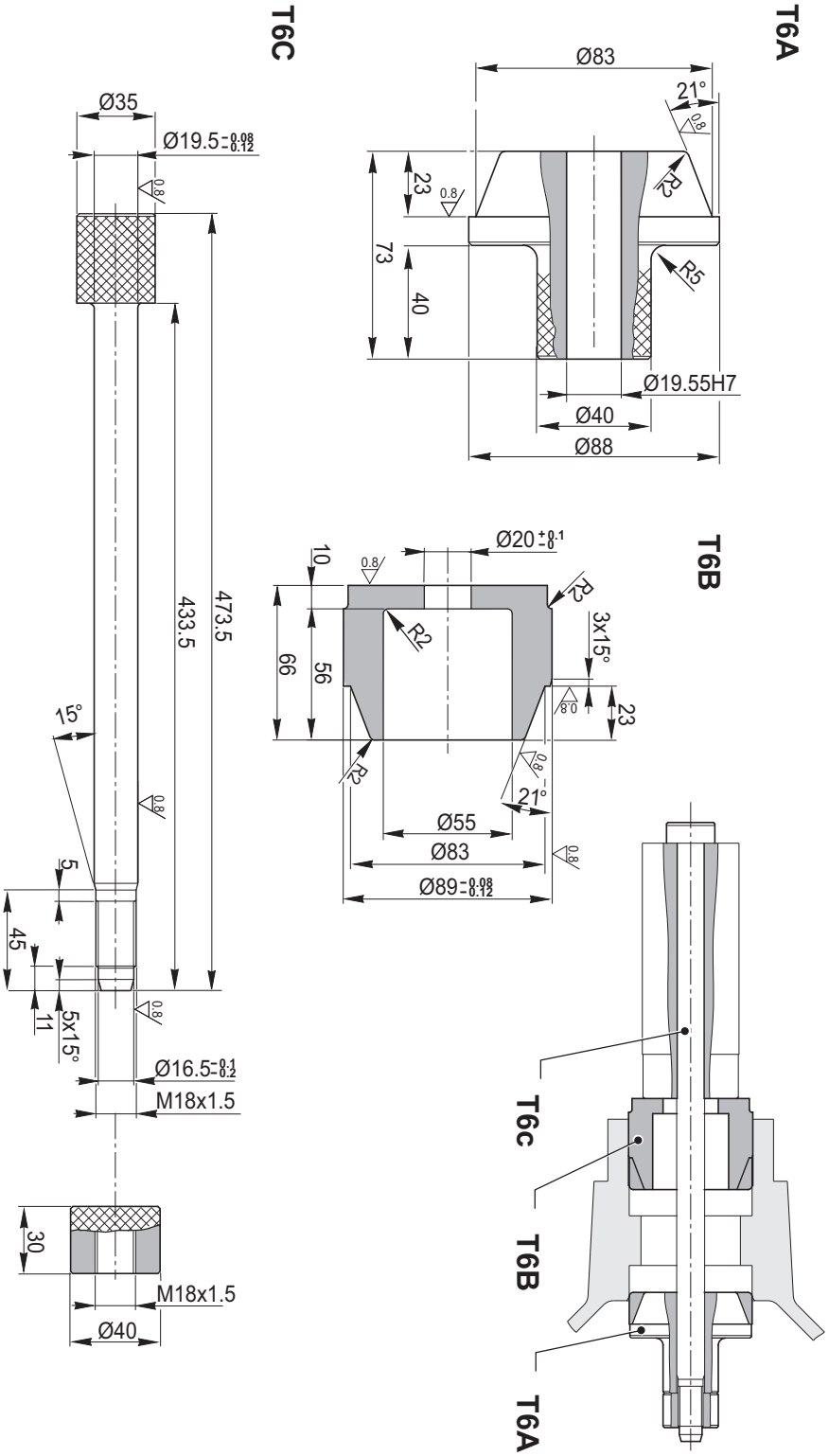
T5

P/N: 2310



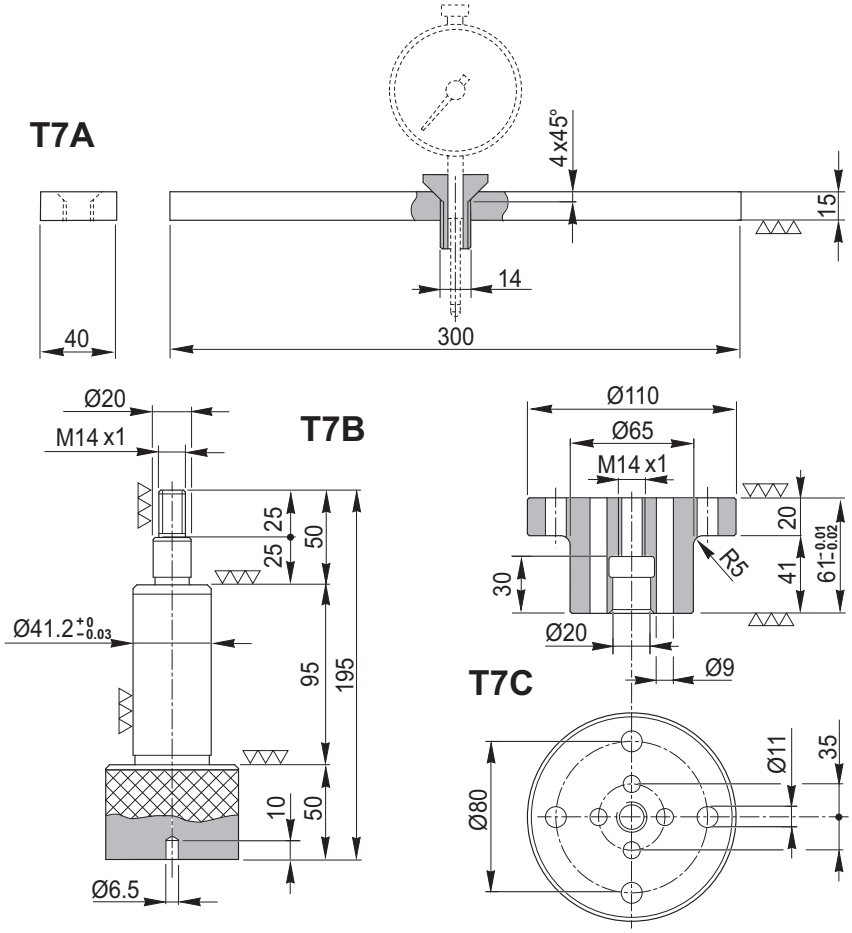
T6

P/N: 3329/3


T6C
Ø35
Ø19.5 -0.08 -0.12
0.8
473.5
433.5
15°
5
45
11
5x15°
Ø16.5 -0.1 -0.2
M18x1.5
30
M18x1.5
Ø40
T6A
Ø83
21°
0.8
23
R2
73
40
R5
Ø19.55H7
Ø40
Ø88
T6B
Ø20 +0.1 0
10
66
56
3x15°
23
Ø55
Ø83
Ø89 -0.08 -0.12
T6c
T6B
T6A

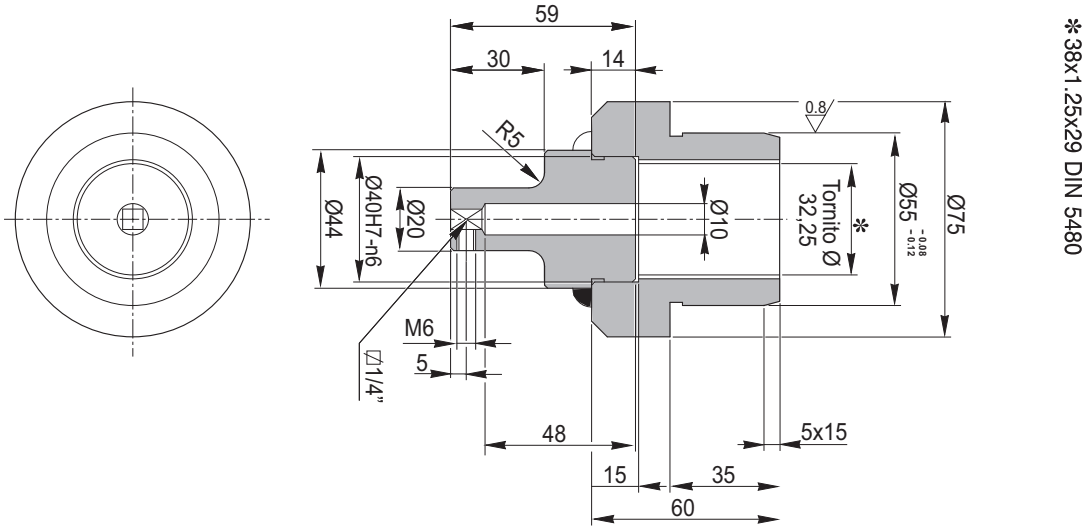
T7

P/N: 2312



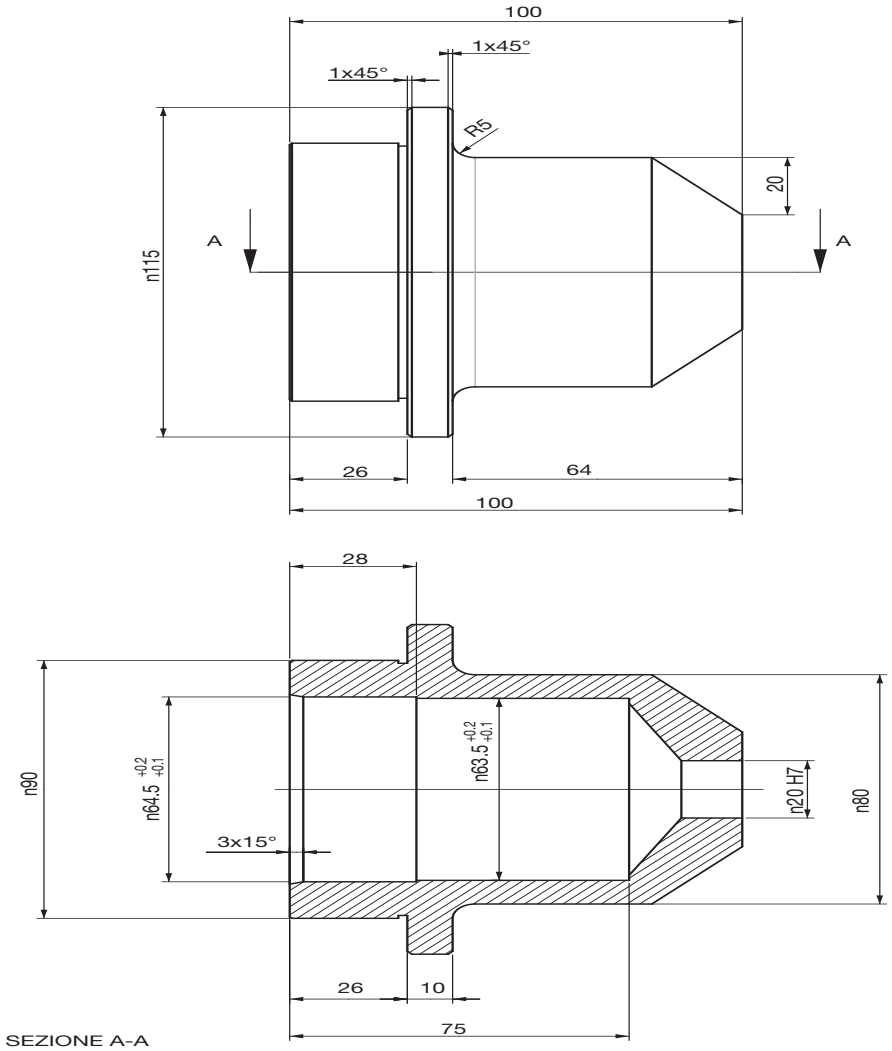
T8

P/N: 3354



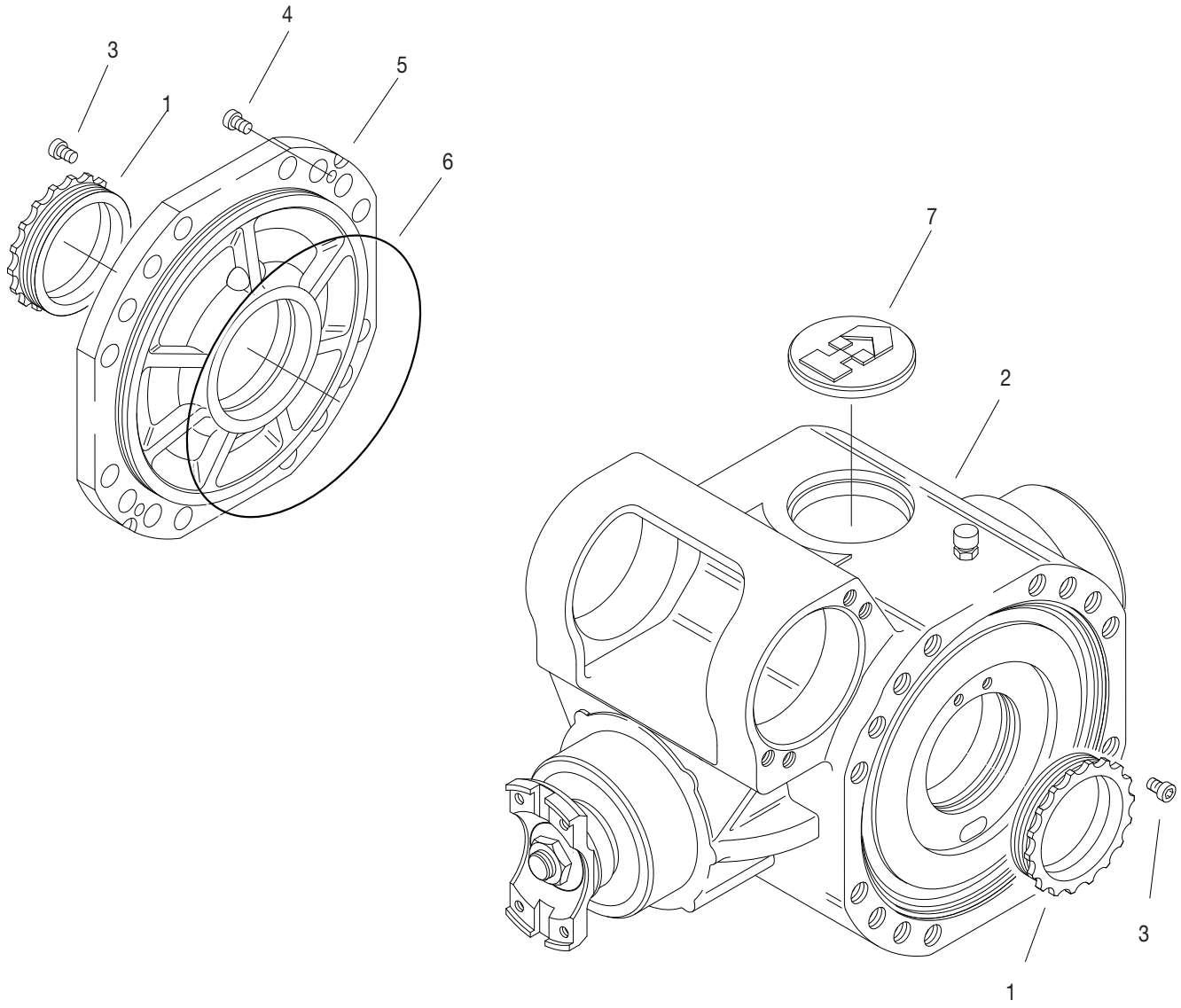
T9

P/N: 3327


100
1x45°
1x45°
R5
20
A
A
n115
26
64
100
28
n90
n64.5 +0.2 +0.1
n63.5 +0.2 +0.1
n20 H7
n80
3x15°
26
10
75
SEZIONE A-A

DIFFERENTIAL UNIT

EXPLODED VIEW



DISASSEMBLY

⚠CAUTION

Before draining oil, release the internal pressure, for details see OIL DRAINING MANDATORY PROCEDURE p. 14.

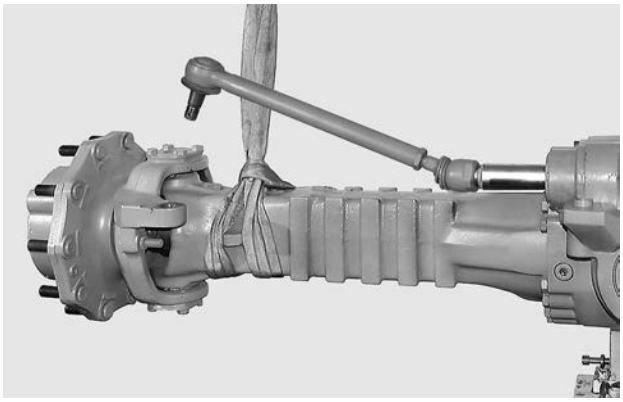


FIGURE 1: Remove the complete arms.
For details, see CHECKING WEAR AND REPLACING THE BRAKING DISCS p. 19.

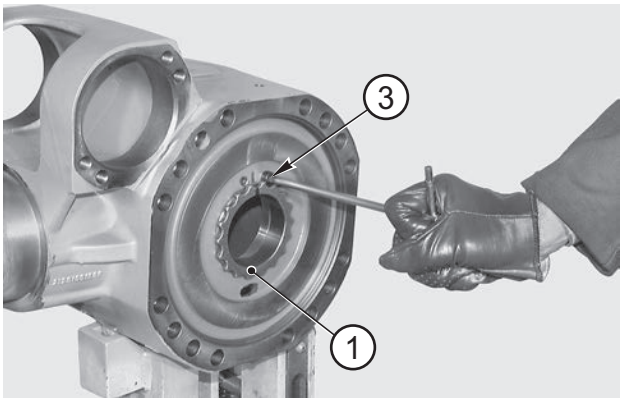


FIGURE 2: Mark the position of the ring nuts (1). Remove the capscrews (3) from the ring nuts (1).

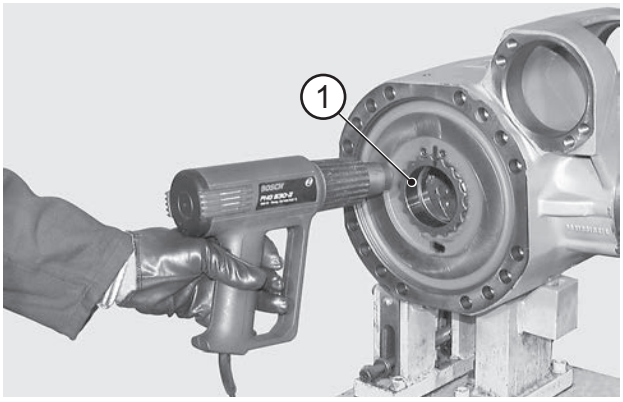


FIGURE 3: Uniformly heat the ring nuts (1) up to a temperature of 80° C.

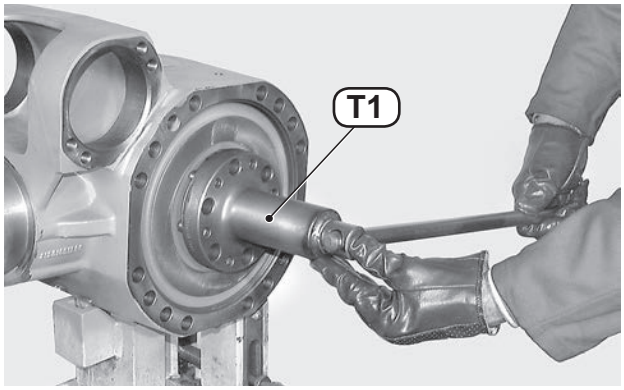


FIGURE 4: Apply tool T1 (See drawing T1 p. 60) and remove the ring nuts.

NOTE:

Accurately clean the threaded portions on ring nuts of body and cover.

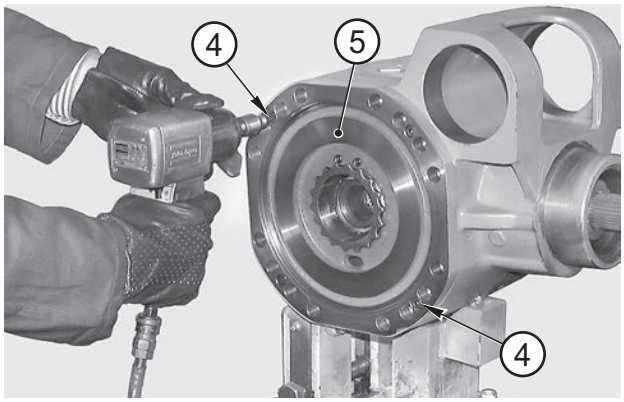


FIGURE 5: Remove the capscrews (4) from the middle cover (5).

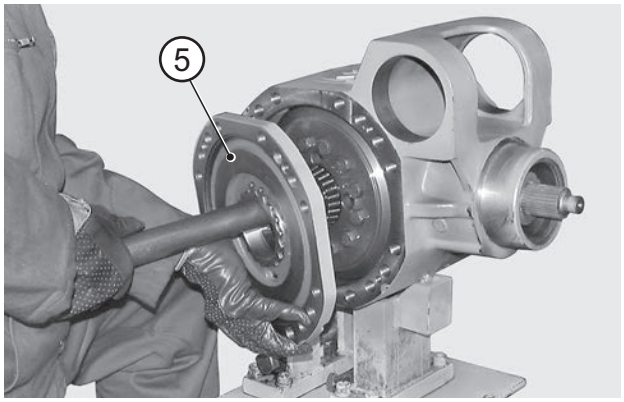


FIGURE 6: Insert a screwdriver in the opposing slots then force and remove the middle cover (5) and the complete differential unit.

NOTE:

Support the pieces using a rod.

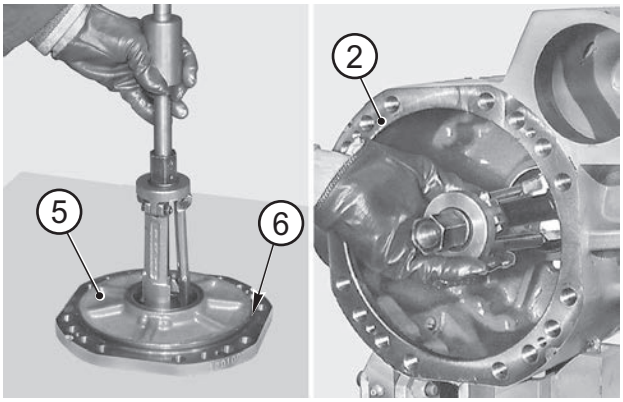


FIGURE 7: If the bearings need replacing, extract the external thrust blocks of the bearings (7) and (8) from middle cover and central body.

NOTE:

Accurately check the o-ring (6).

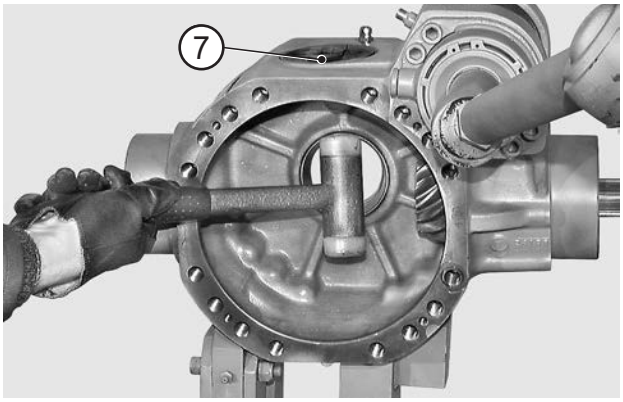


FIGURE 8: Remove the top plug (7).

NOTE:

The cap must be replaced each time the unit is disassembled.

ASSEMBLY

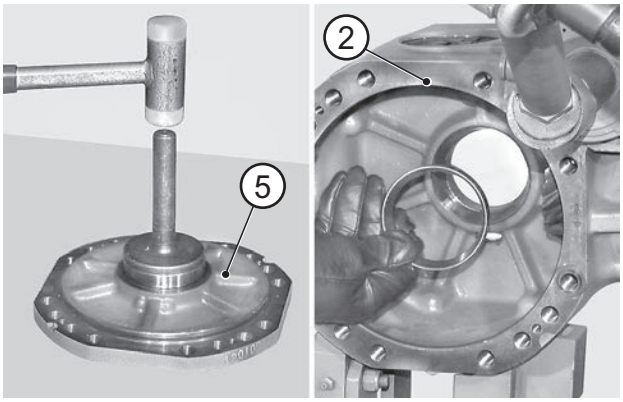


FIGURE 9: If the bearings are replaced, insert the external thrust blocks in the middle cover (5) and in the central body (2).

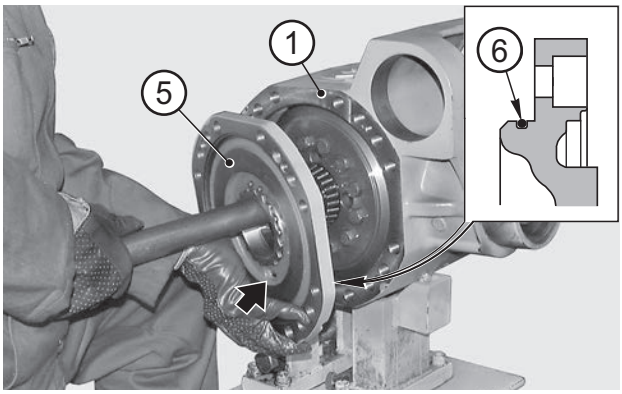


FIGURE 10: Position the differential unit in the central body (2) with the help of a bar and fit the middle cover (5).

NOTE:

Thoroughly check the state of the o-ring (6) and make sure that the cover is fitted with the oil discharge in the lower position.

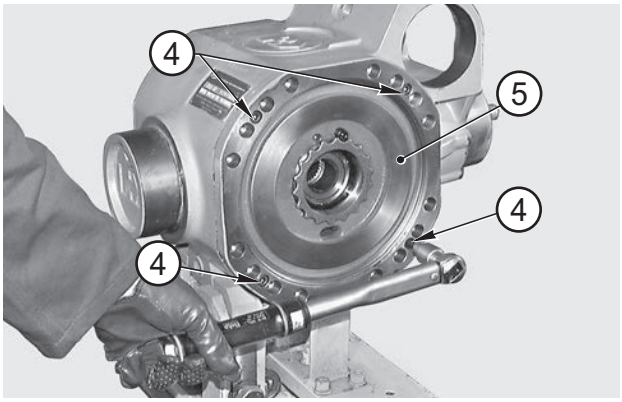


FIGURE 11: Lock the middle cover (5) with screws (4). Torque wrench setting for screw: 23.8 - 26.2 N·m

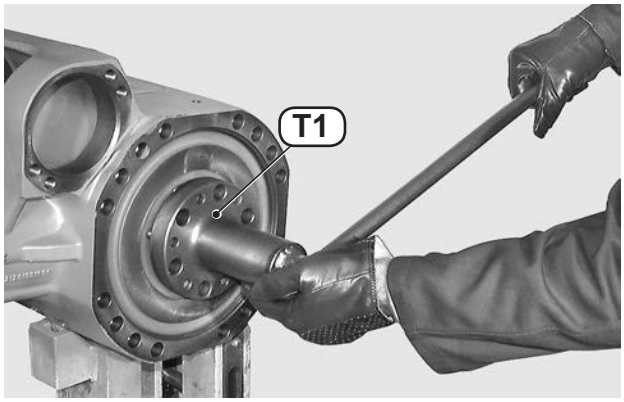


FIGURE 12: Tighten ring nuts on the crown side until clearance between pinion and crown is zero, then lock the crown; go back 1/4 - 1/2 turn.

NOTE:

If the ring nuts (1) are removed, coat them with Loctite 242.

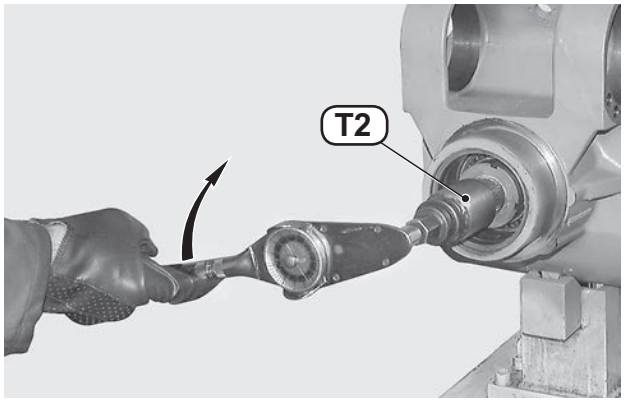


FIGURE 13: Pre-set the bearings by means of the ring nut situated on the opposite side of the crown, so as to increase pinion torque up to 140 - 210 Ncm.

⚠CAUTION

If bearings are not new, check the static torque; if bearings are new, check the continuous torque.

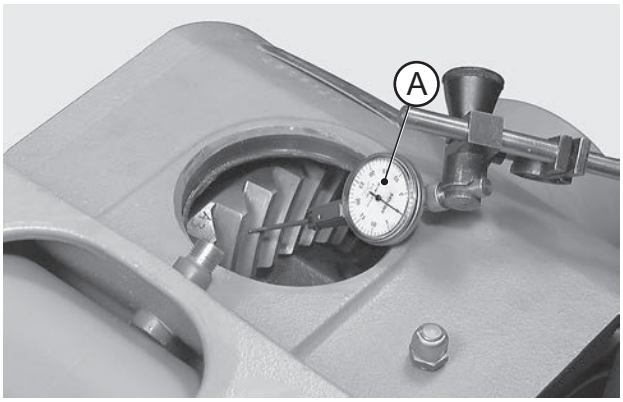


FIGURE 14: Introduce a dial indicator with rotary key "A" through the top plug hole (7).
Position the dial indicator on the center of one of the teeth of the crown, pre-set it to 1mm and reset it.

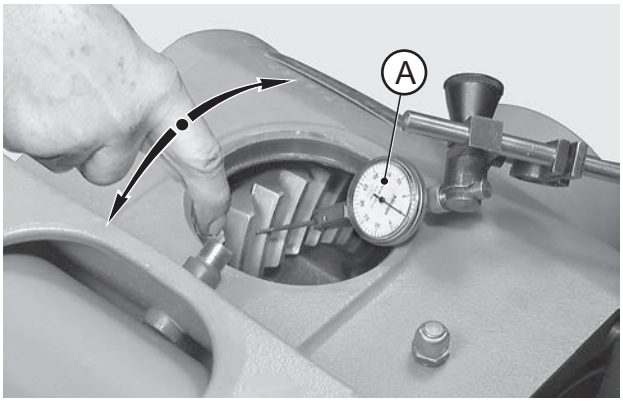


FIGURE 15: Manually move the crown in both directions in order to check the existing backlash between the pinion and the crown.

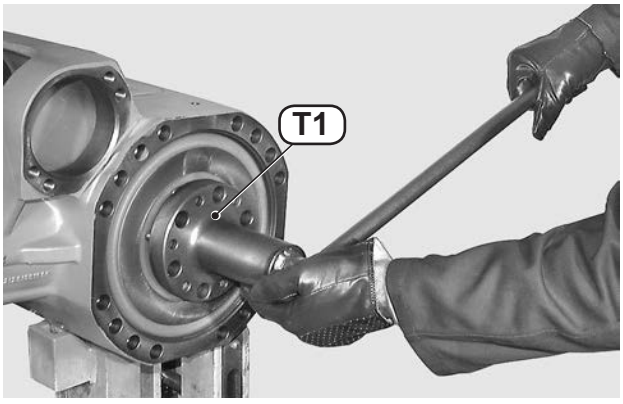


FIGURE 16: Adjust the backlash between the pinion and the crown by unloosing one of the ring nuts (1) and tightening the opposite to compensate.
Normal backlash: see table.

RATIO - RAPPORTO VERHÄLTNIS RAPORTE - RAPPORT	CLEARANCE - GIOCO - SPIEL JUEGO - JEU	
	MIN.	MAX.
9÷34	0,18	0,23
9÷35	0,13	0,18
11÷31	0,20	0,28
11÷35	0,13	0,18
12÷35	0,13	0,18
12÷41	0,15	0,20
14÷32	0,18	0,23
14÷36	0,15	0,20
14÷41	0,15	0,20
15÷32	0,18	0,23
15÷47	0,13	0,18

FIGURE 17: Difference between MIN and MAX clearance for whole circumference should not exceed 0.09 mm.

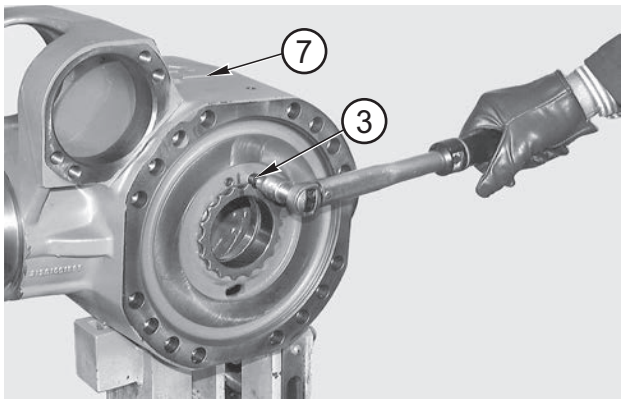


FIGURE 18: Apply Loctite 242 to the screws (3), fit them into one of the two holes and tighten.
Torque wrench setting: 23.8 - 26.2 N·m
Fit the top plug (7) after applying repositionable jointing compound for seals to the rims.

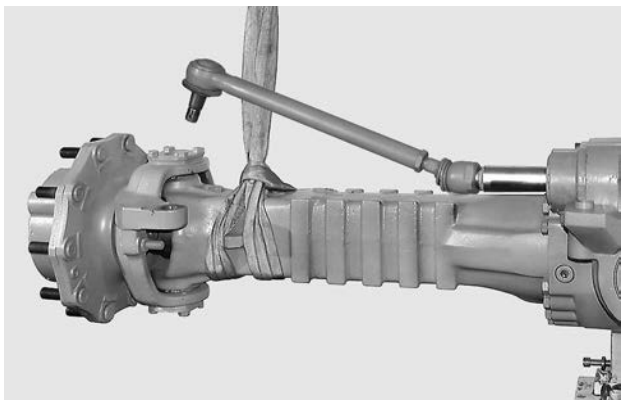
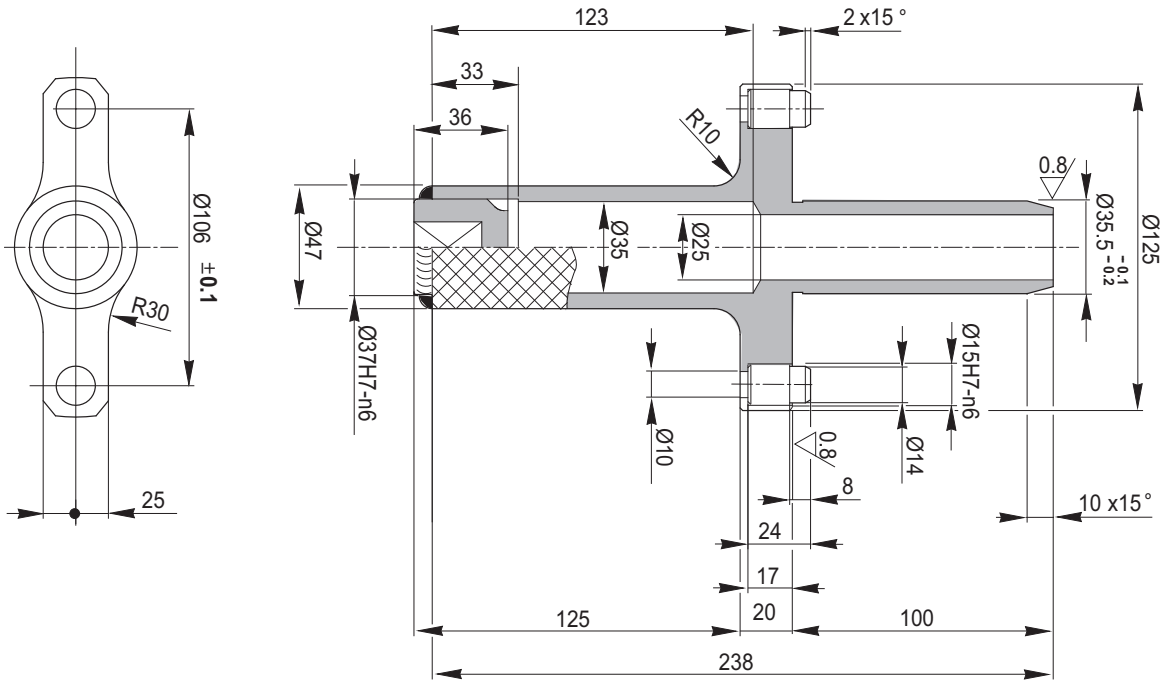


FIGURE 19: Re-install the complete arms.
For details, see CHECKING WEAR AND REPLACING THE BRAKING DISCS p. 19.

SPECIAL TOOLS

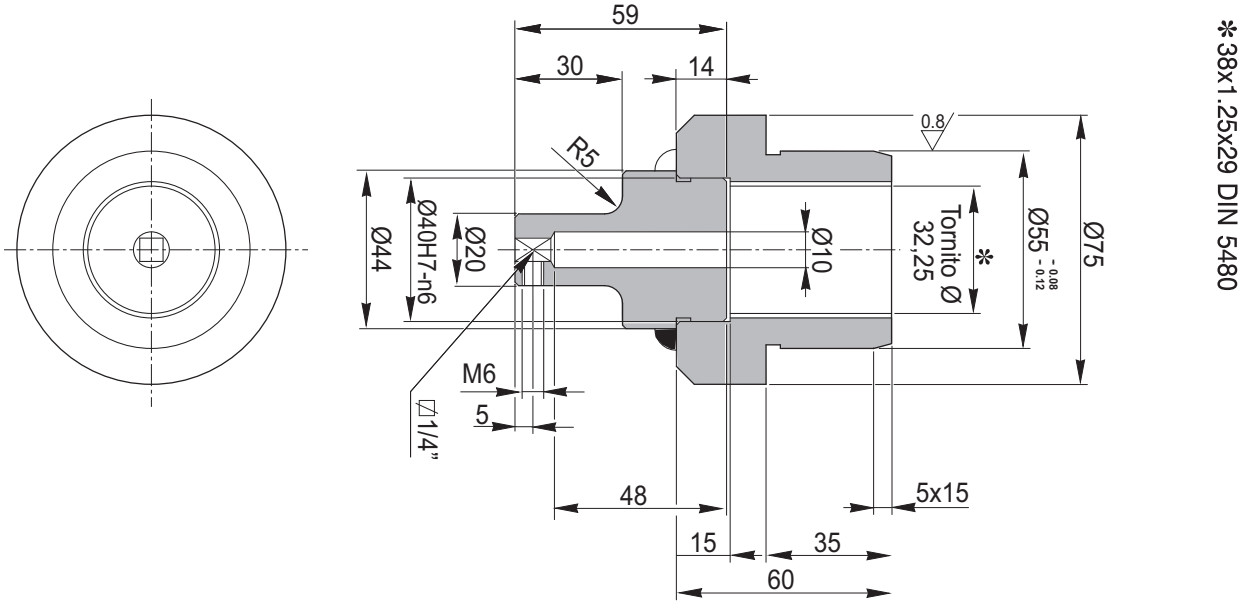
T1

P/N: 3333



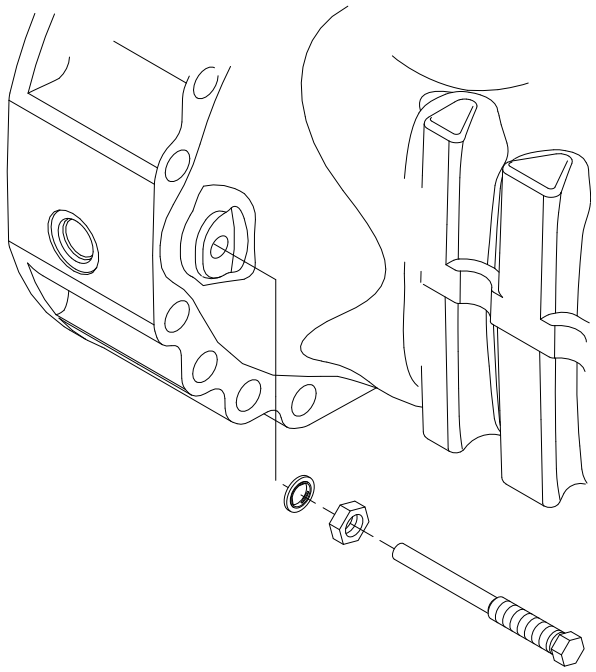
T2

P/N: 3317/4



MANUAL EMERGENCY RELEASE

EXPLODED VIEW



RELEASE

⚠DANGER

Before maintaining brakes, when the axle is installed on vehicle, follow all safety instructions in the Original Equipment Manufacturer (OEM) manual that came with the vehicle.

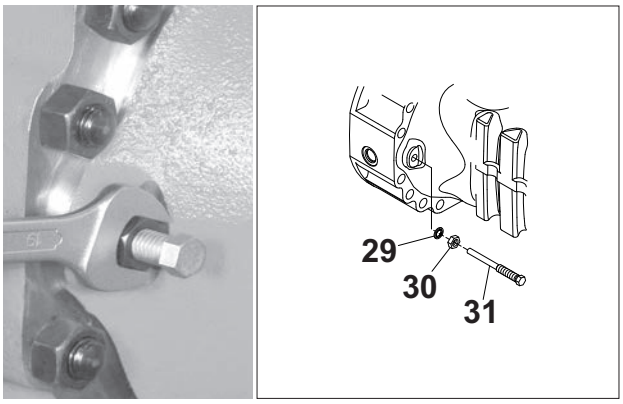


FIGURE 1: Loosen nuts (30) of screws (31) provided for the mechanical and manual release of the braking units, then move the nuts backwards by approximately 8 mm.

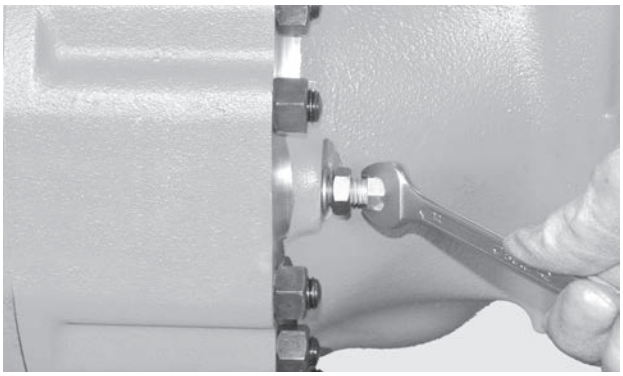


FIGURE 2: Tighten screws (31) so as to fasten them onto the pressure plate (23).

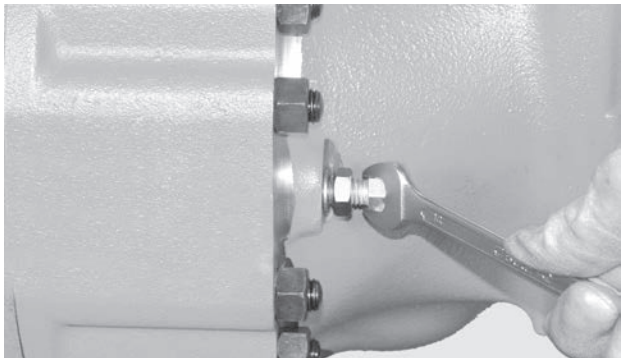


FIGURE 3: Using a wrench, tighten the screws (31) in an alternate sequence by 1/4 turn at a time so as to compress the Belleville washers (1) and disengage the braking disks.

⚠CAUTION

Tighten maximum by one turn.

ADJUSTMENT

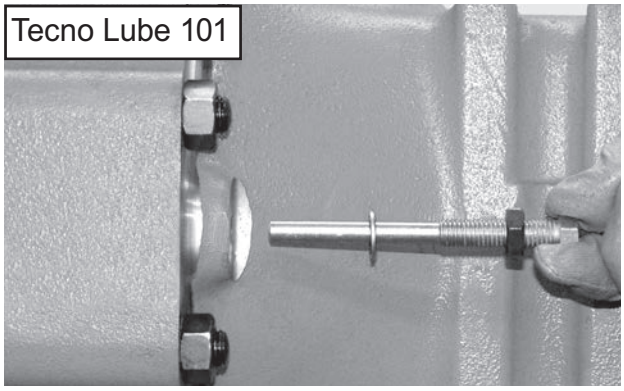


FIGURE 4: Remove screws complete with nuts and seals. Replace seals, apply silicone-based Tecno Lube/101 grease to the screws and install all parts into the arm.

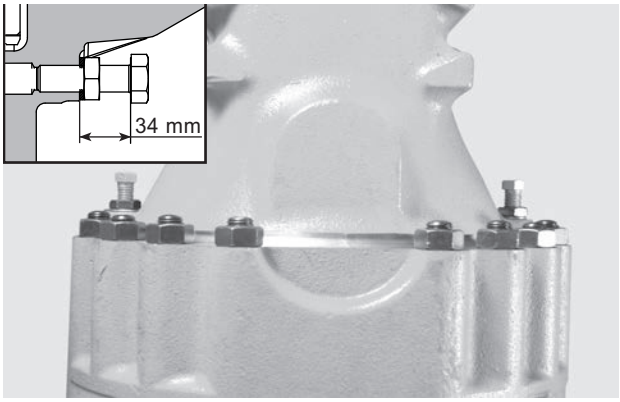


FIGURE 5: Adjust screws (31) to obtain a distance of 34 ± 0.5 mm between axle machined surface and screw underhead.

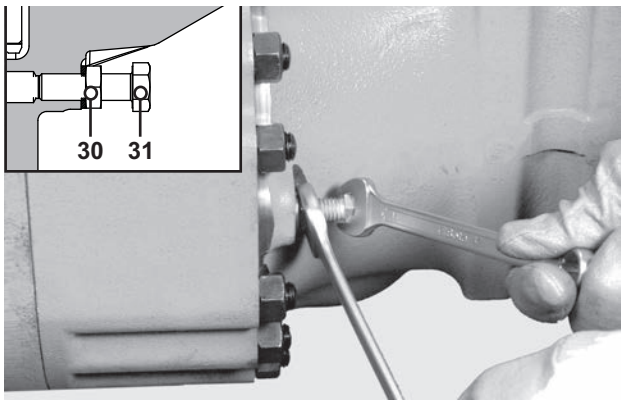


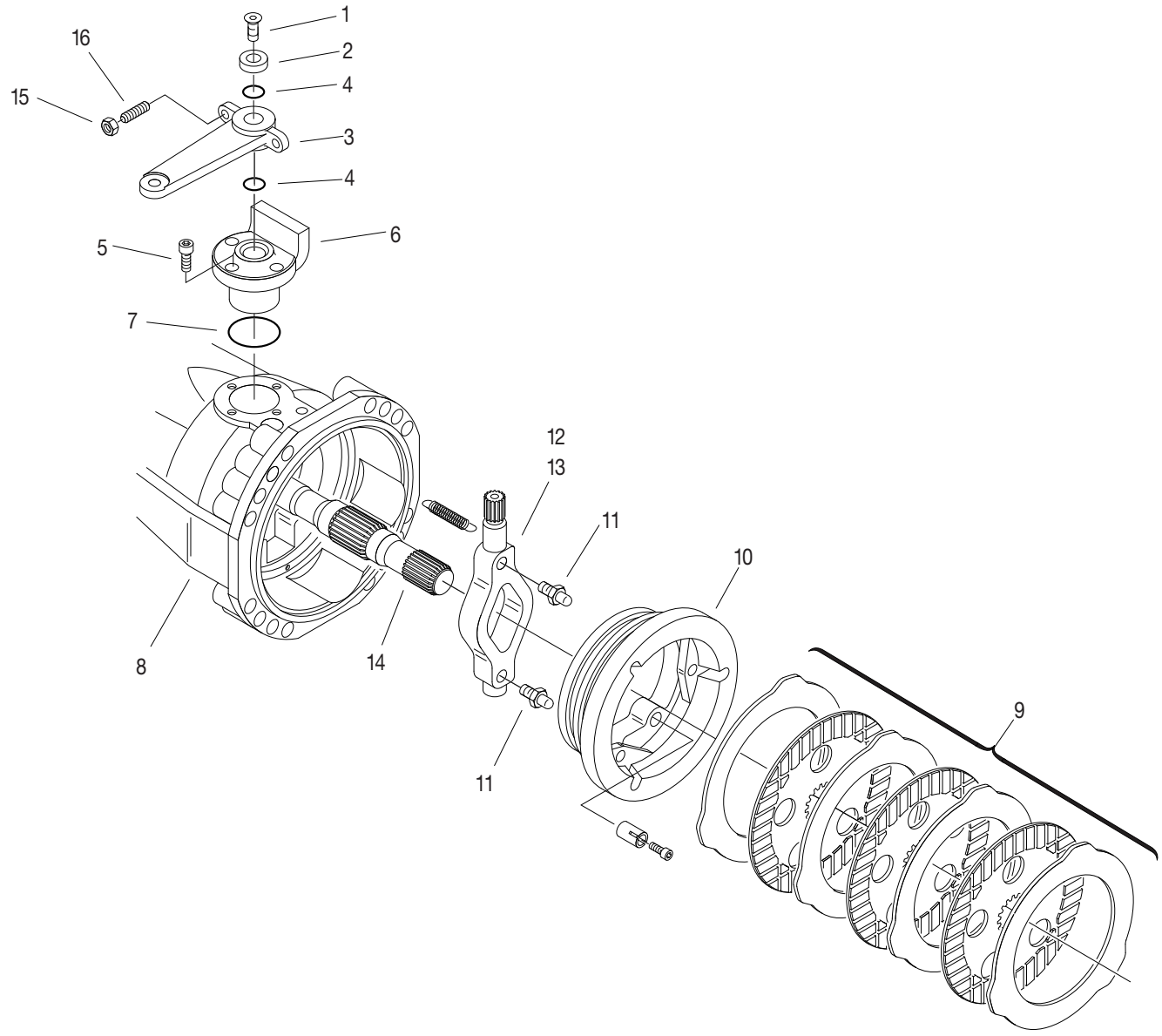
FIGURE 6: Lock into position with nuts (30).

⚠CAUTION

Hold screws (31) into position while locking the nuts (30); after locking, check the distance of screws (31) once more.

MECHANICAL PARKING BRAKE

EXPLODED VIEW



DISASSEMBLY

⚠DANGER

Before maintaining brakes, when the axle is installed on vehicle, follow all safety instructions in the Original Equipment Manufacturer (OEM) manual that came with the vehicle.

⚠CAUTION

Before draining oil, release the internal pressure, for details see OIL DRAINING MANDATORY PROCEDURE p. 14.

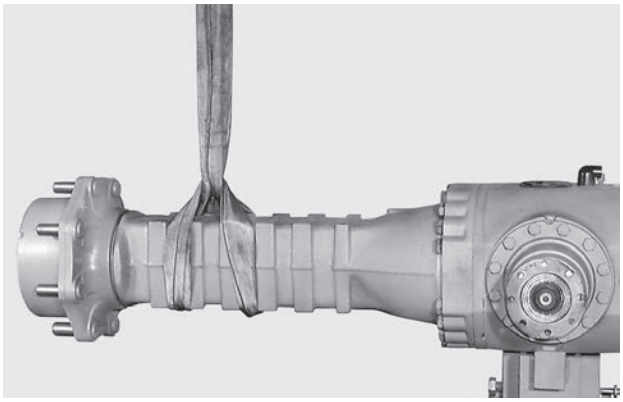


FIGURE 1: Though the photos in this manual refer to a steering and oscillating axle, the operations described apply anyway.

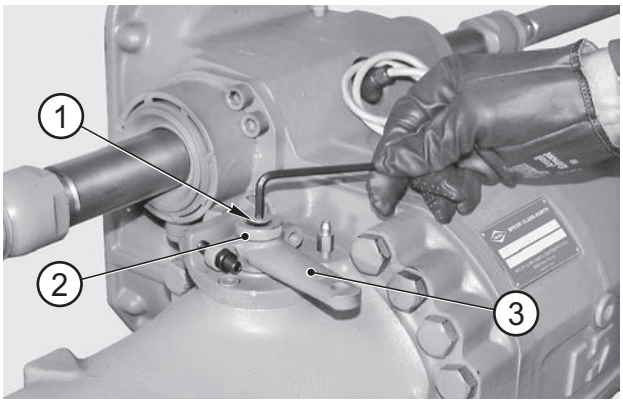


FIGURE 2: Draw out the screw (1) locking the washer (2) that stops the lever (3).

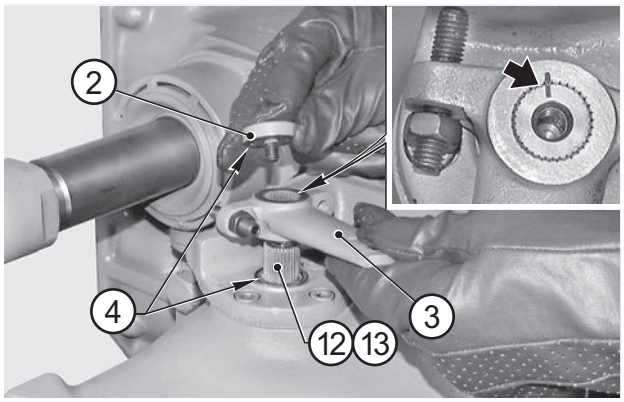


FIGURE 3: Remove washer (2), lever (3) and o-rings (4). Mark the positions of levers (3) in relation to the thrust levers (12) and (13).

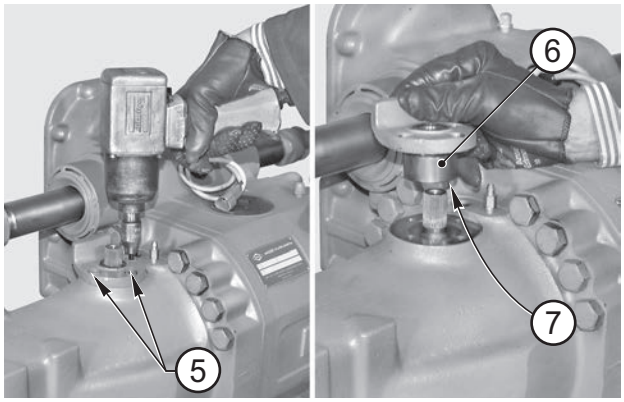


FIGURE 4: Draw out the screws (5) and remove bushing (6) along with o-ring (7).

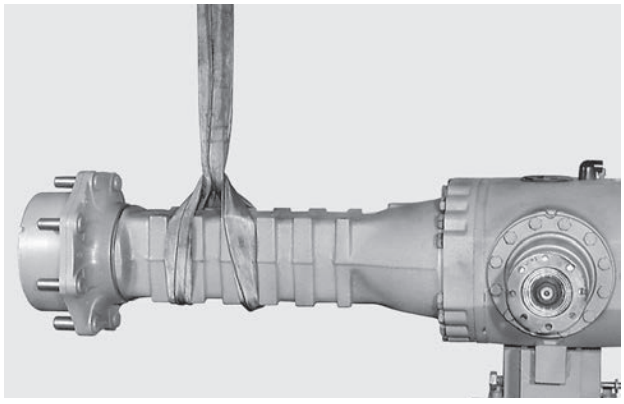


FIGURE 5: Connect the whole arm (8) to the hoist and put the rod under light tension.
Remove the whole arm; for details, see CHECKING WEAR AND REPLACING THE BRAKING DISCS p. 19.

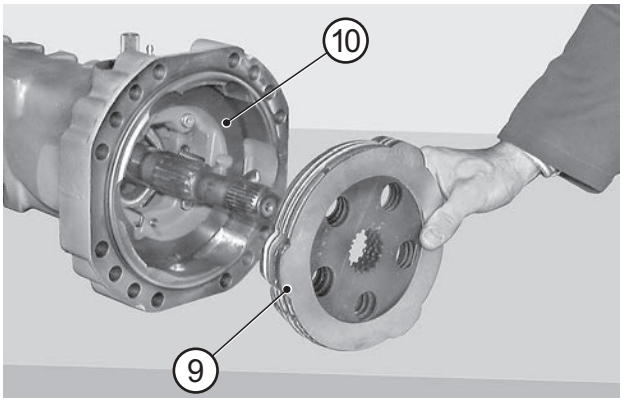


FIGURE 6: Remove the braking disks (9) and the whole piston (10).
For details, see CHECKING WEAR AND REPLACING THE BRAKING DISCS p. 19.

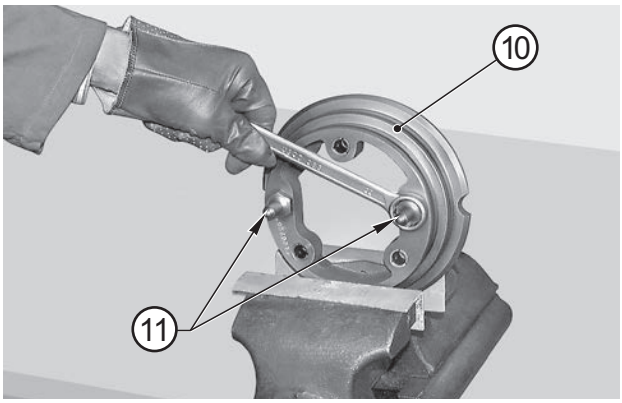


FIGURE 7: If pins (11) need replacing, block the piston (10) into a vice whose jaws are covered in smooth material and remove the pins.

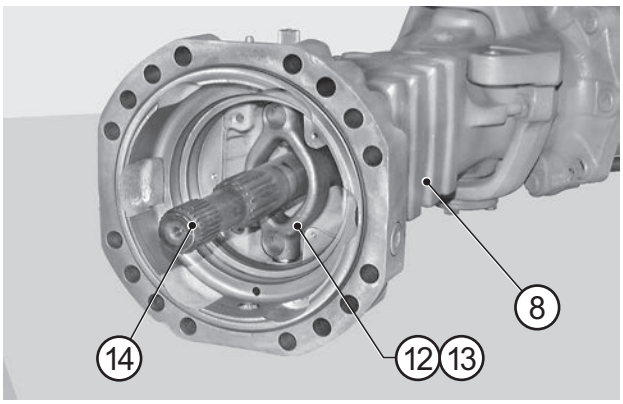


FIGURE 8: If thrust levers (12) and (13) need replacing, remove the U-joint (14) before removing the arms (8).
For details, see PLANETARY REDUCTION AND AXLE SHAFT p. 25.

ASSEMBLY

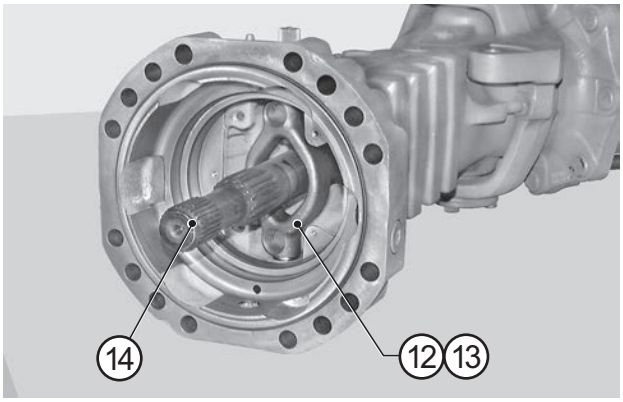


FIGURE 9: Install thrust levers (12) and (13), then install the U-joint (14).
For details, see PLANETARY REDUCTION AND AXLE SHAFT p. 25.

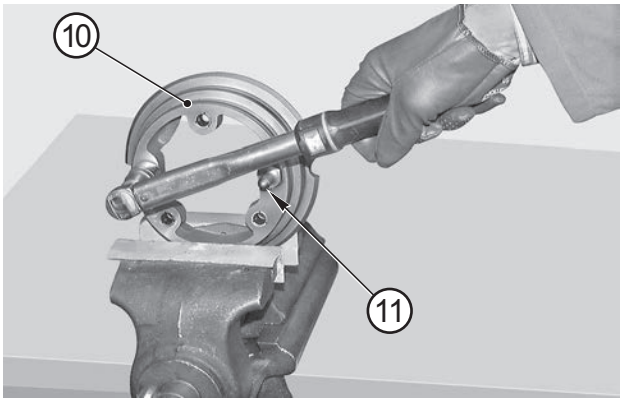


FIGURE 10: Apply Loctite 270 to the threaded portion of the pins (11) and fit them onto the piston (10).
Block them: torque wrench setting 30 - 35 N·m.

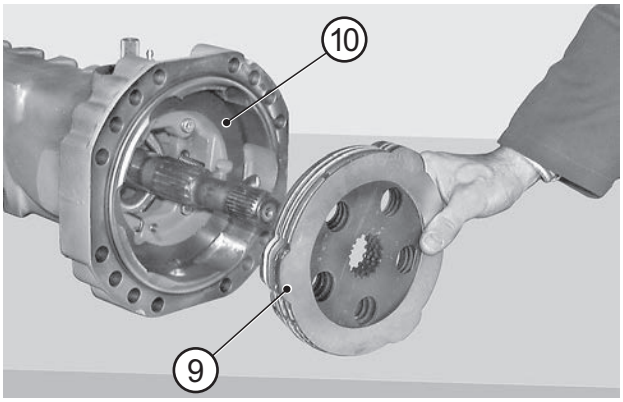


FIGURE 11: Re-install the piston (10) and the braking disks (9).
For details, see HYDRAULIC NEGATIVE BRAKE p. 149.

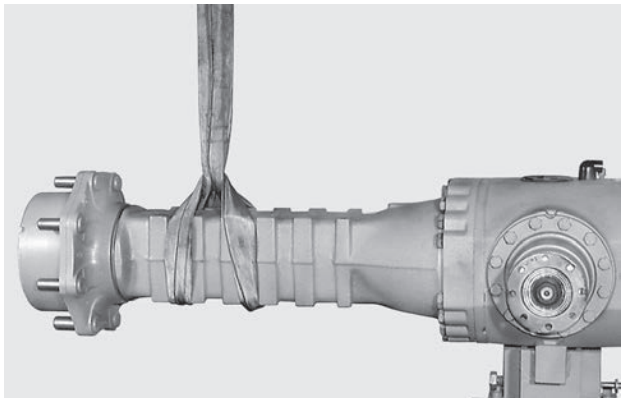


FIGURE 12: Install the arms (8) into the main body; check flatness and block arms following the appropriate procedures illustrated in section HYDRAULIC NEGATIVE BRAKE p. 149.

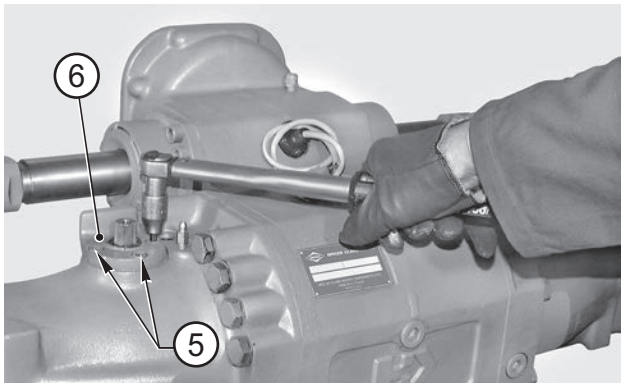


FIGURE 13: Install the reduction bushing (6) complete with o-ring (7) and block it with screws (5). Tighten screws with a torque wrench setting of 23.8 - 26.2 N·m.

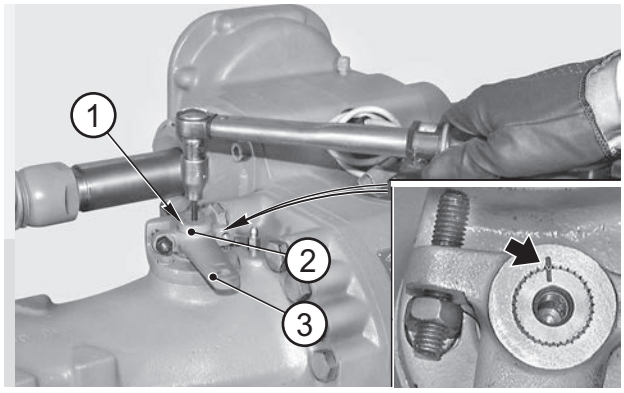


FIGURE 14: Install in sequence the lower o-ring (4), the lever (3) and the washer (2) with the relative o-ring (4).
Block with screw (1) and tighten using a torque wrench setting of 23.8 - 26.2 N·m.

⚠CAUTION

Refer and keep to the positions marked during disassembly.

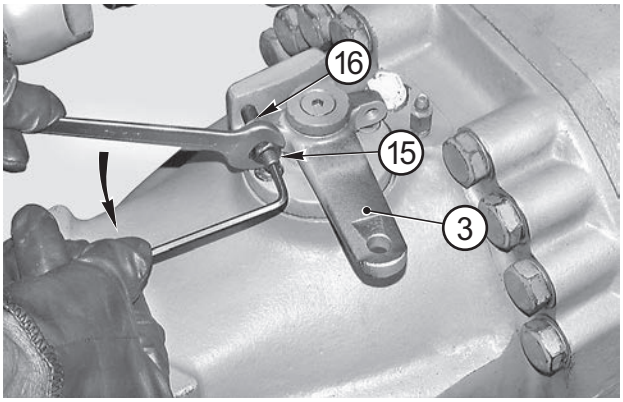


FIGURE 15: Connect the braking circuit and apply maximum working pressure to set the disks.
Release the pressure, loosen nut (15) and unscrew stud (16) by a few turns.

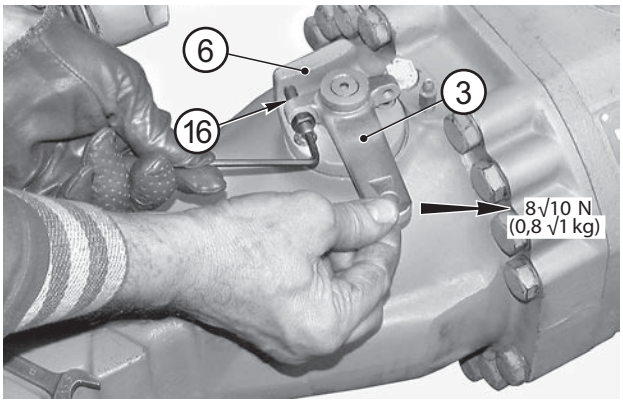


FIGURE 16: Apply a force of 8 - 10 N (0.8 - 1 kg) to lever (3). Direct the force towards the braking direction in order to eliminate the idle stroke.
While the force is being applied, tighten stud (16) until it is caused to rest onto reduction bushing (6).

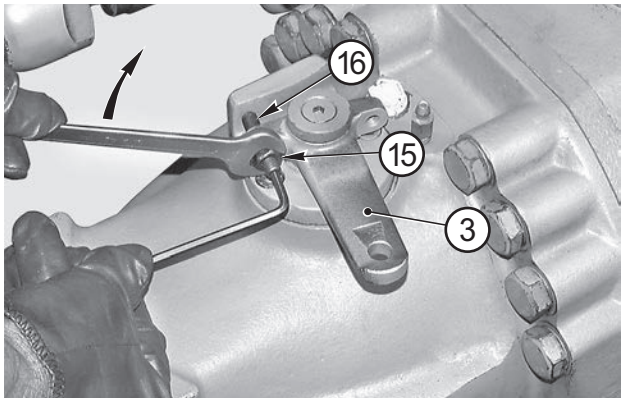


FIGURE 17: Lock stud (16) in this position with nut (15). Torque wrench setting: 20 - 25 N·m.

⚠CAUTION

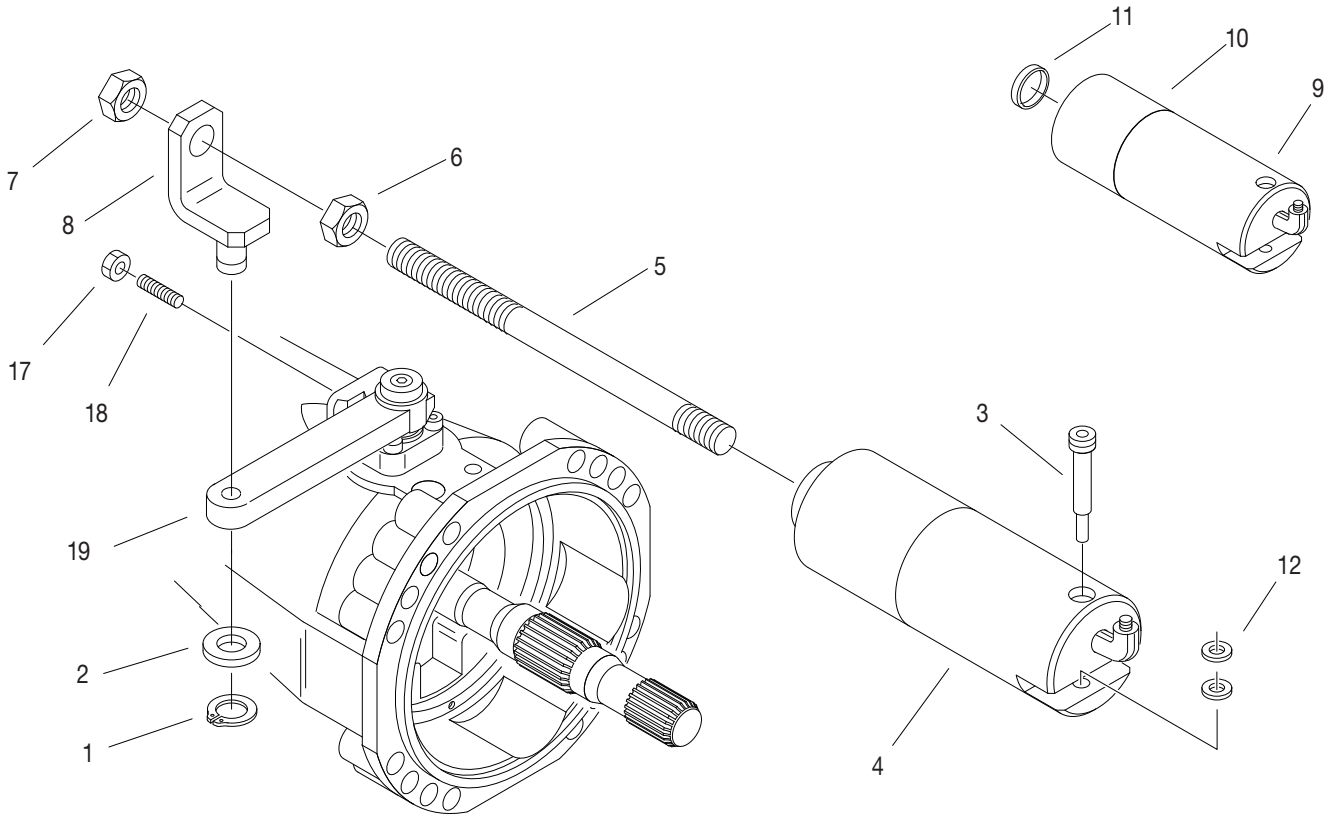
The idle stroke should be eliminated without preloading thrust levers (12) and (13).

FIGURE 18: After connecting the control cable, check that when brakes are released both studs (16) do lean against bushing (6).

ASSEMBLY

EXTERNAL HYDRAULIC NEGATIVE BRAKE

EXPLODED VIEW



DISASSEMBLY

⚠DANGER

Before maintaining brakes, when the axle is installed on vehicle, follow all safety instructions in the Original Equipment Manufacturer (OEM) manual that came with the vehicle.

⚠CAUTION

Before draining oil, release the internal pressure, for details see OIL DRAINING MANDATORY PROCEDURE p. 14.

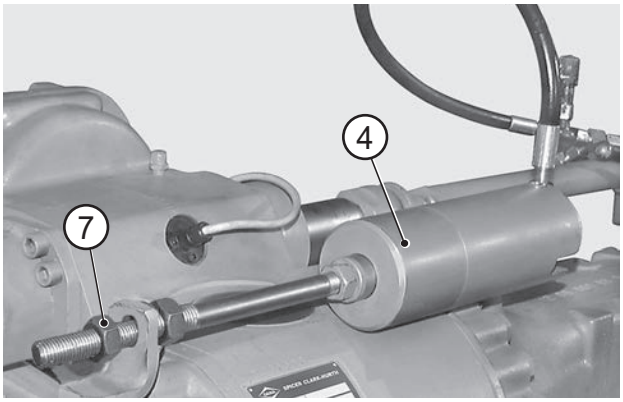


FIGURE 1: Insert pressure into cylinder (4) in order to release the brakes.

NOTE:

If the machine hydraulic system cannot be used, use an external manual pump.

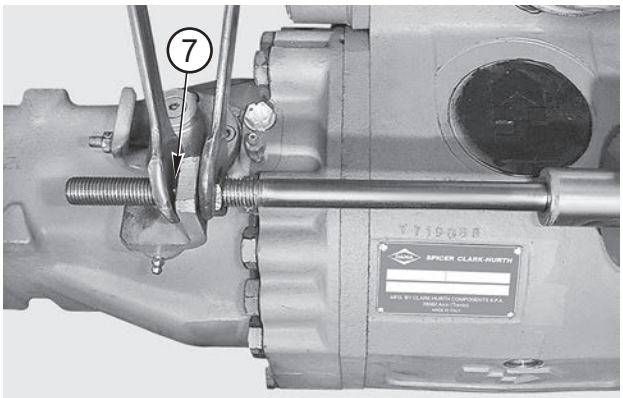


FIGURE 2: Loosen and remove the external nut (7).

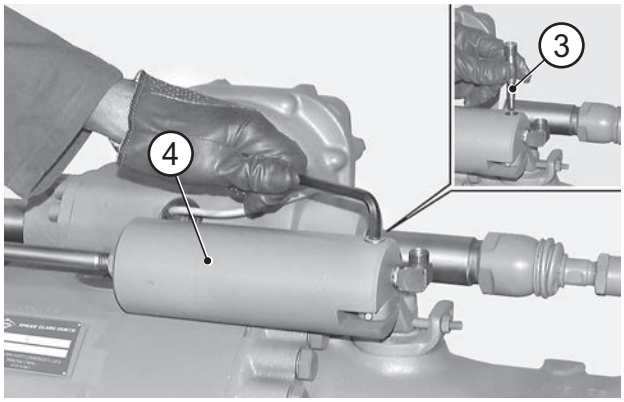


FIGURE 3: Release the pressure in the cylinder and disconnect the pressure delivery tube.
Remove the fulcrum pin (3) from the cylinder (4) complete with washers (12).

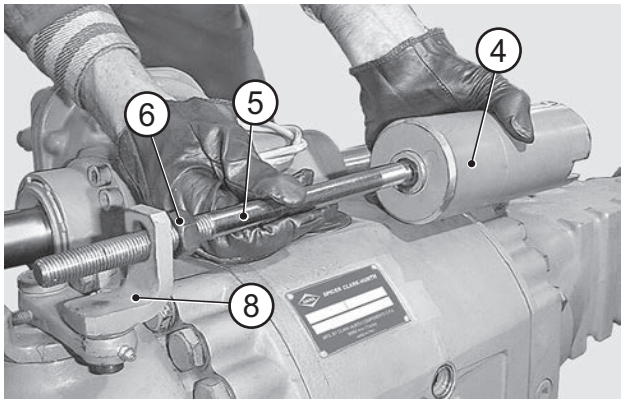


FIGURE 4: Remove the cylinder assembly (4) complete with rod (5), internal nut (6) and support (8).

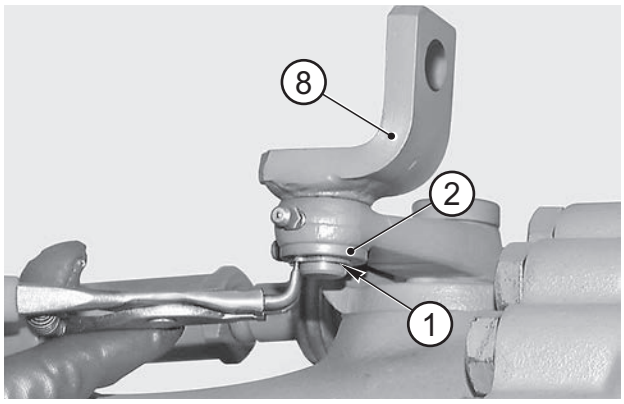


FIGURE 5: Remove the snap ring (1) that checks the support (8) and remove the spacer (2).

ASSEMBLY

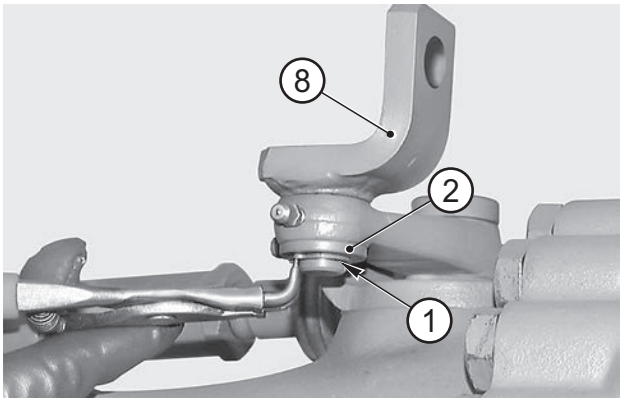


FIGURE 6: Install spacer (2) and insert the pin of support (8) into the right-hand braking lever. Fit the second spacer (2) and snap ring (1).

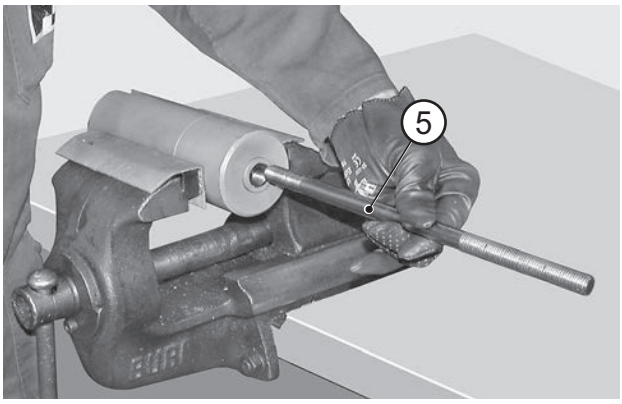


FIGURE 7: Apply Loctite 270 to the rod (5) and screw it in the piston (13) as far as it will go.

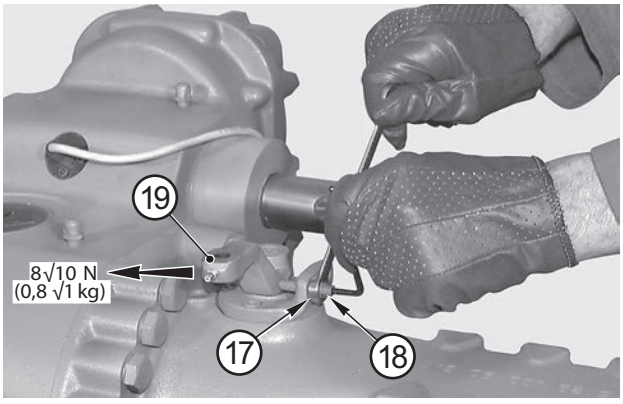


FIGURE 8: Loosen nuts (17) and set braking levers (19) clearances to zero by turning studs (18); lock nuts (17) with a torque wrench setting of 20 - 25 N·m.

⚠CAUTION

Clearances should be set to zero without causing any preloading.

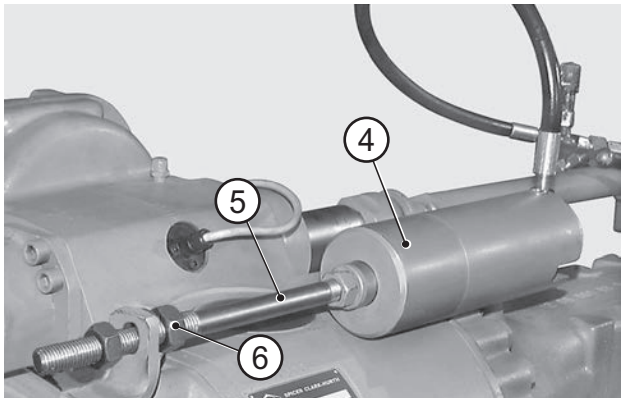


FIGURE 9: Install cylinder (4) complete with rod (5) and internal nut (6).

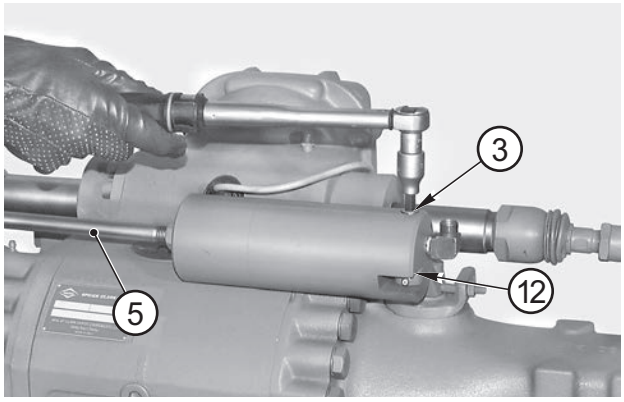


FIGURE 10: Center the hole of fulcrum pin (3) and washers (12).
Apply Loctite 242 to the pin thread, screw and tighten pin with a torque wrench set at 25 - 30 N·m.

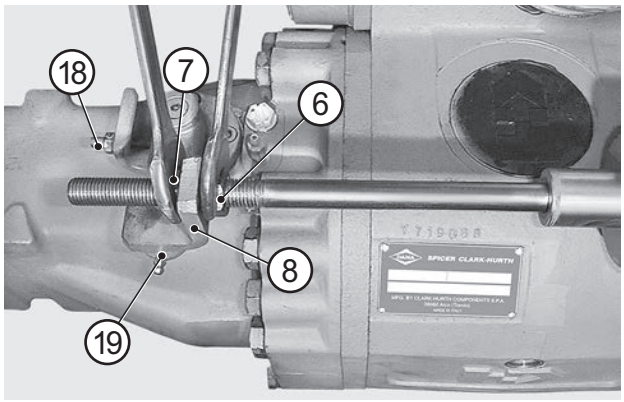


FIGURE 11: Introduce pressure into the cylinder (4) and while holding both levers (19) back against the adjusting screws (18), move nuts (6) and (7) so that they are made to rest against support (8); lock the nuts with a torque wrench setting of 50 - 60 N·m.

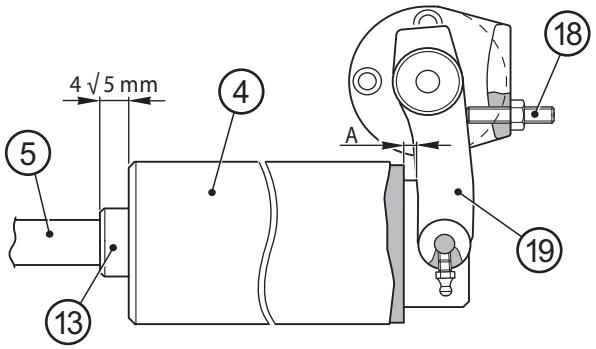
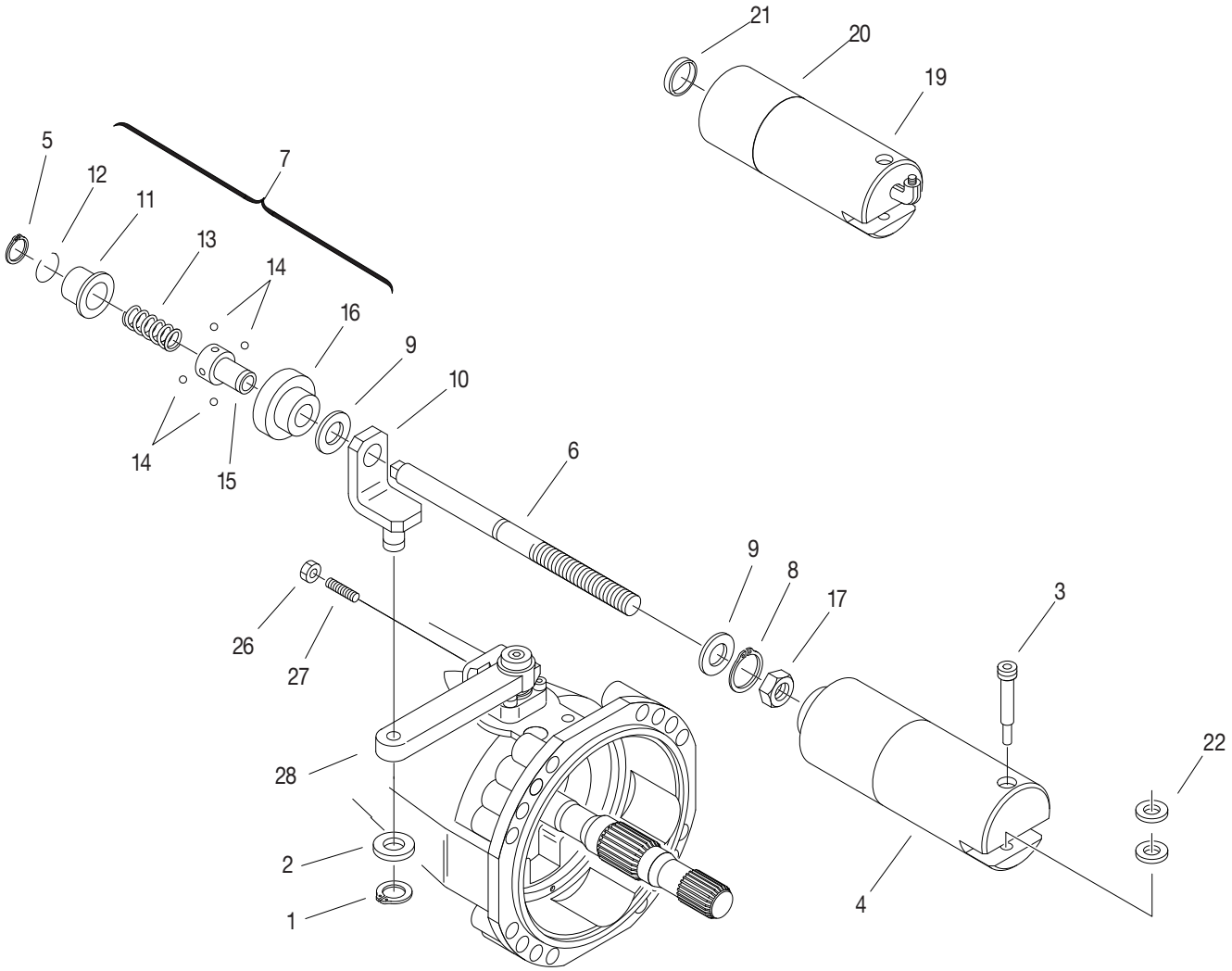


FIGURE 12: Check that, when the brakes are released (pressure inserted), levers (19) lean against the screws (18) without pre-stressing them and make sure that a clearance "A" is left between cylinder (4) and lever (19).
Also check that when pressure is released, piston (13) projects out by 4 - 5 mm.

EXTERNAL HYDRAULIC NEGATIVE BRAKE WITH QUICK RELEASE

EXPLODED VIEW



DISASSEMBLY

⚠DANGER

Before maintaining brakes, when the axle is installed on vehicle, follow all safety instructions in the Original Equipment Manufacturer (OEM) manual that came with the vehicle.

⚠CAUTION

Before draining oil, release the internal pressure, for details see OIL DRAINING MANDATORY PROCEDURE p. 14.

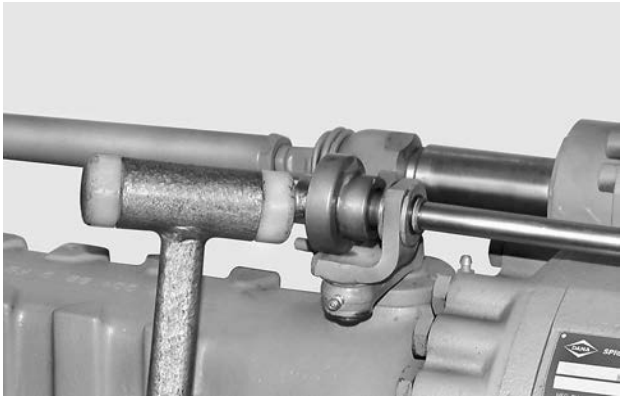


FIGURE 1: Before starting any operation on the assembly, disable the cylinder by giving a light hammer blow to the external ring of the check unit.

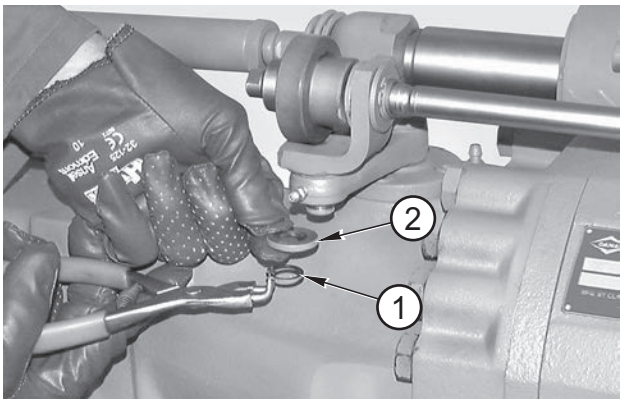


FIGURE 2: Remove snap ring (1) and extract spacer (2).

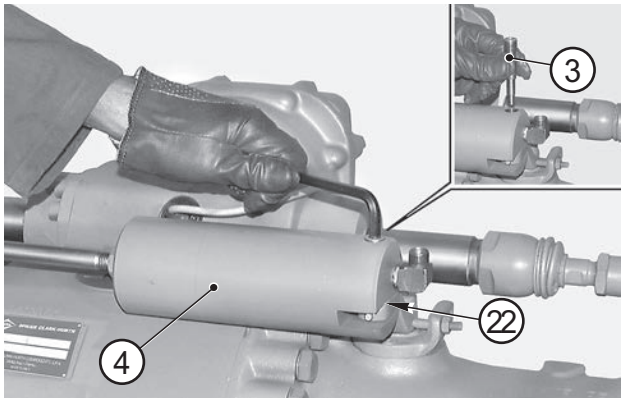


FIGURE 3: Remove the fulcrum pin (3) from the cylinder (4) complete with washers (22).

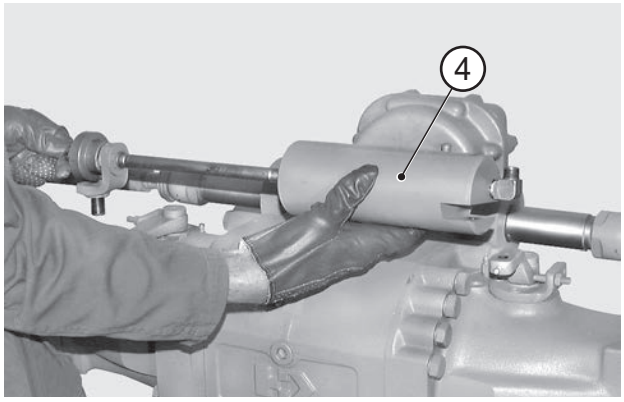


FIGURE 4: Remove the complete cylinder set (4).

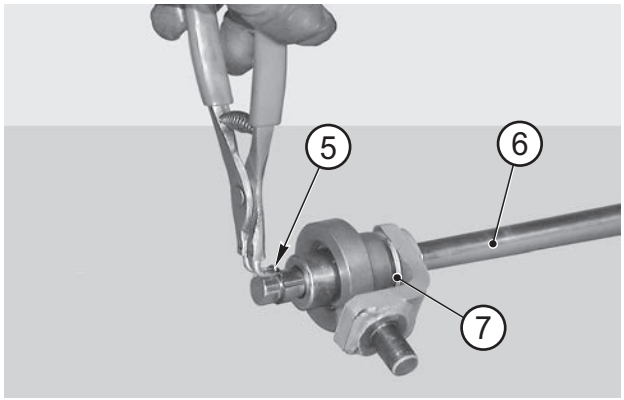


FIGURE 5: Remove snap ring (5) from stem (6) and extract the check unit (7).

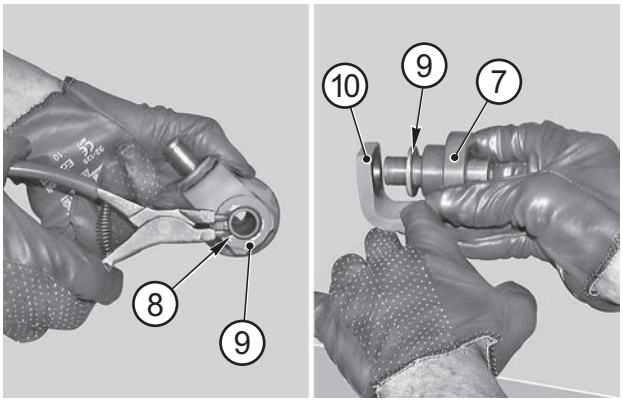


FIGURE 6: Remove snap ring (8) and washer (9) and separate support (10) and second washer (9) from the check unit (7).

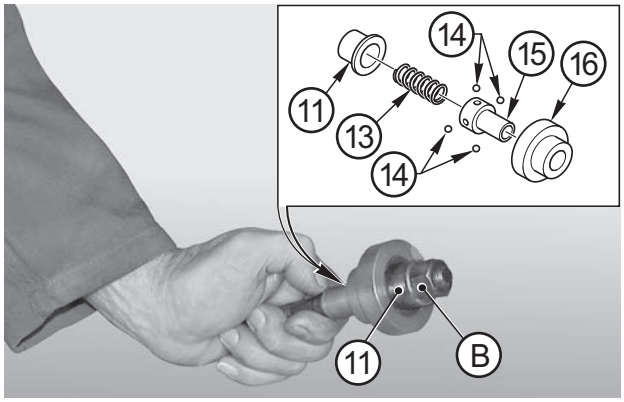


FIGURE 9: Slowly release nut "B" and disassemble the check unit.

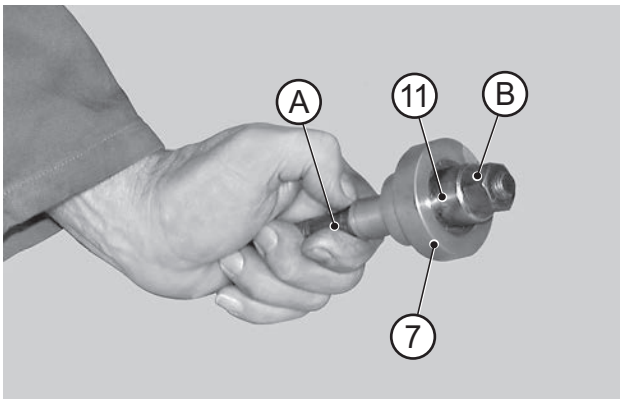


FIGURE 7: Introduce an M14x100 screw "A" into the hole of the check unit (7) and screw a nut "B" until the spring seat (11) is moved to the end of stroke.

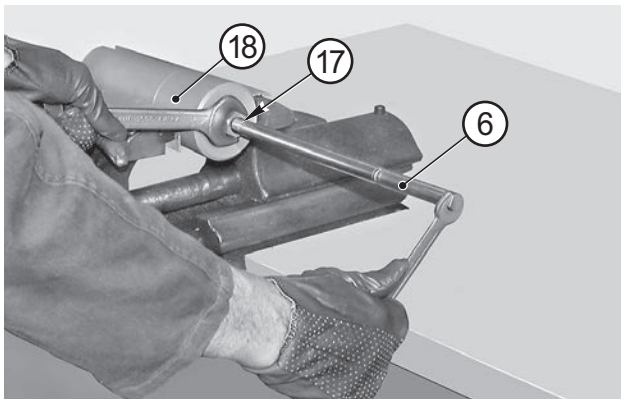


FIGURE 10: Loosen nut (17) and remove stem (6) from the cylinder (18).

NOTE:

Use a hex bolt.

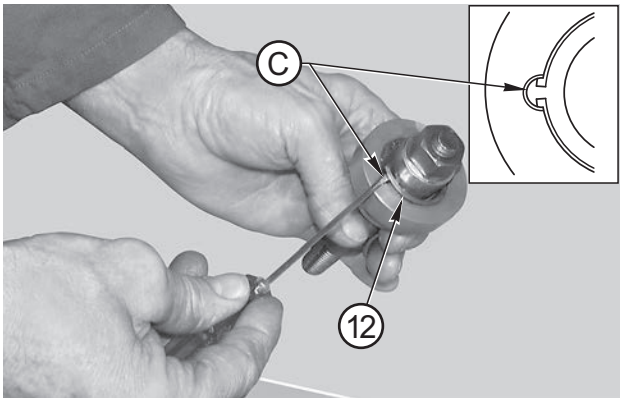


FIGURE 8: Rotate snap ring (12) until ring ends match slot "C".
Remove snap ring (12).

ASSEMBLY

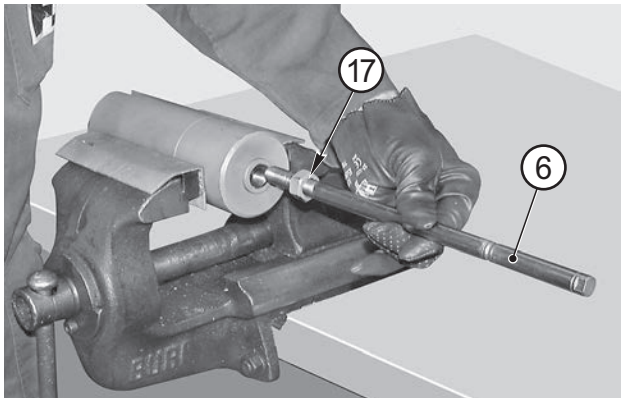


FIGURE 11: Screw stem (6) into the piston without locking the nut (17).

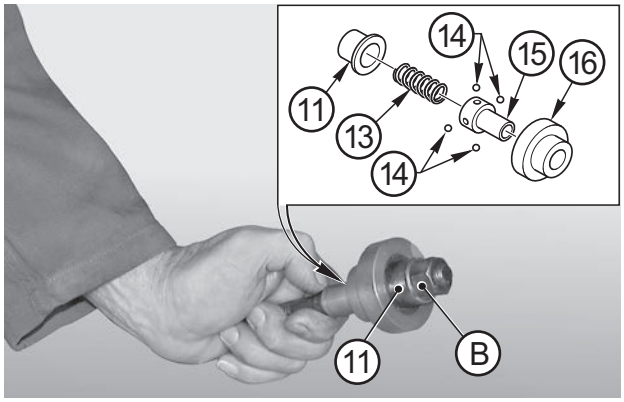


FIGURE 12: Assemble the check unit (7) by inverting the steps followed in the disassembly procedure.

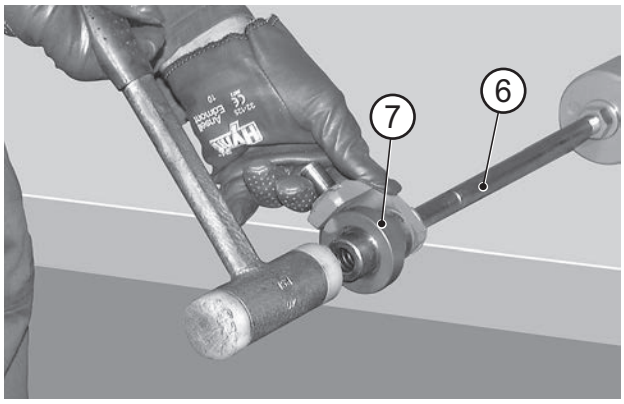


FIGURE 13: Using a plastic hammer, install the check unit (7) onto the stem (6).

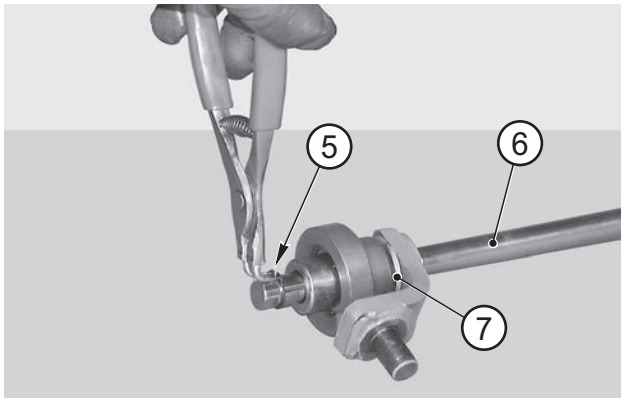


FIGURE 14: Fit the safety snap ring (5) onto the stem (6).

NOTE:

In case the braking disks have been replaced or if brake pistons have been removed: before adjusting the negative braking unit, apply the brakes several times at maximum pressure in order to set clearances.

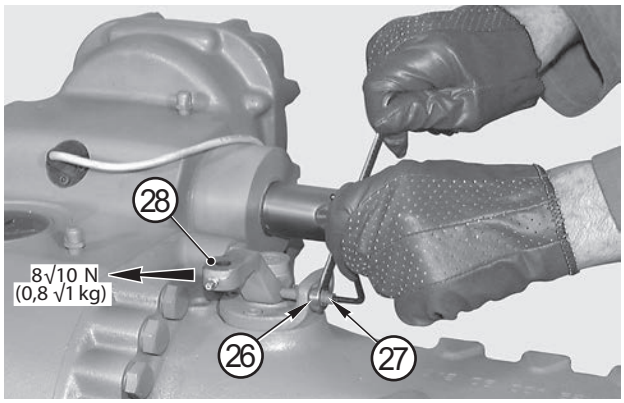


FIGURE 15: Loosen nuts (26) and apply a force of 8 - 10 N (0.8 - 1 kg) to levers (28). Direct the force towards the braking direction to eliminate the clearances by using studs (27); lock nuts (26) to a torque wrench setting of 20 - 25 N·m.

⚠CAUTION

The idle stroke should be eliminated without causing any preloading.

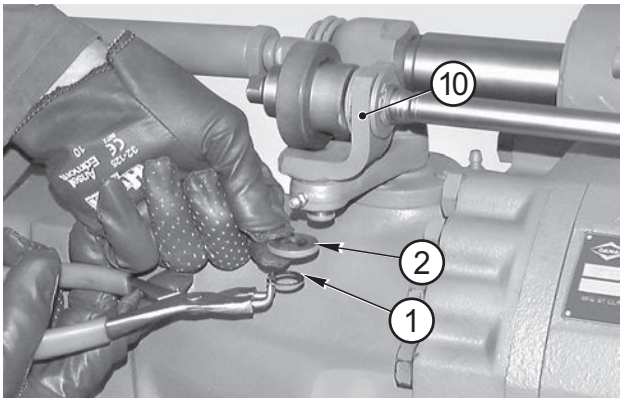


FIGURE 16: Fit the spacer (2) and insert the pin of support (10) in the right-hand braking lever.
Fit the snap ring (1).

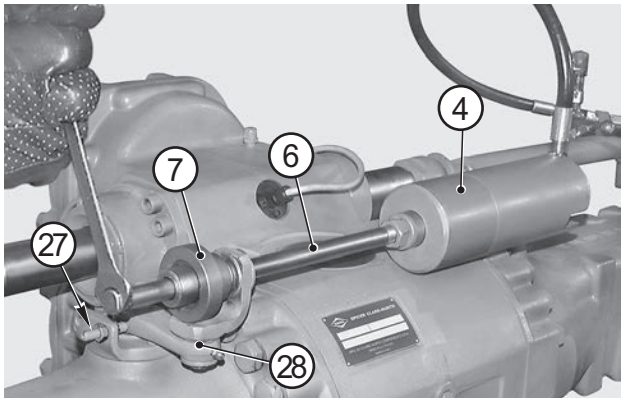


FIGURE 19: Introduce pressure into the cylinder (4) and, with the levers (28) resting against the adjustment studs (27), screw rod (6) to engage the quick release (7) in the slot.

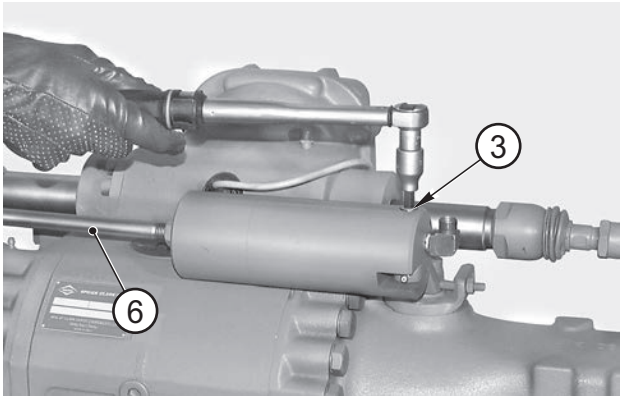


FIGURE 17: Rotate stem (6) to center the hole of the fulcrum pin (3).
Apply Loctite 242 to the thread of the fulcrum pin (3), screw and tighten pin with a torque wrench set to 25 - 30 N·m.

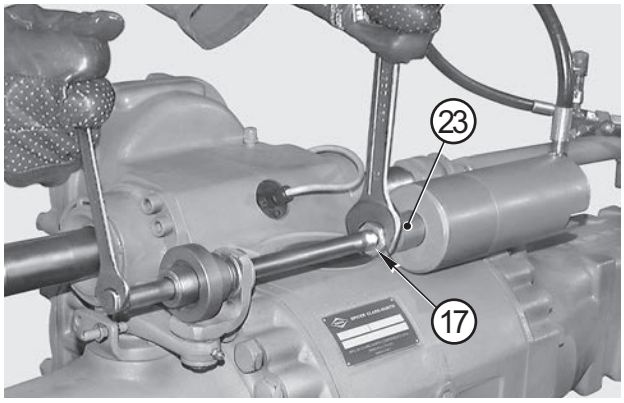


FIGURE 20: Lock nut (17) in position against the stem of the piston (23).
Torque wrench setting for the nut: maximum 40 N·m.

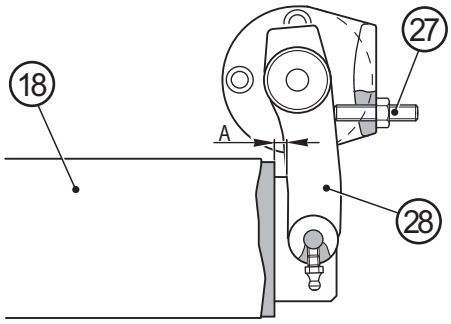


FIGURE 18: Check that a clearance "A" is left between the lever (28) on the cylinder side (resting against the adjustment stud) and cylinder (18).
If necessary, remove the lever, turn it by one tooth in relation to the spline and repeat idle stroke elimination procedure.

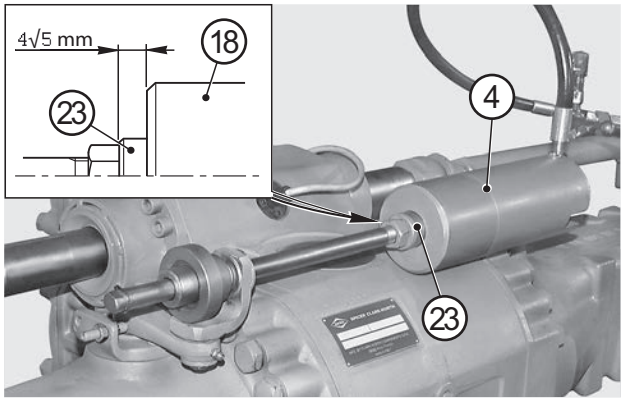


FIGURE 21: Release the pressure and check that piston (23) returns and stops in a position where it projects out from the cylinder head (4) by 4 - 5 mm.

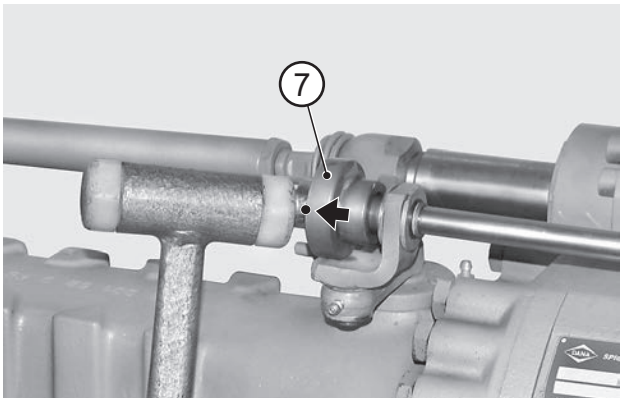
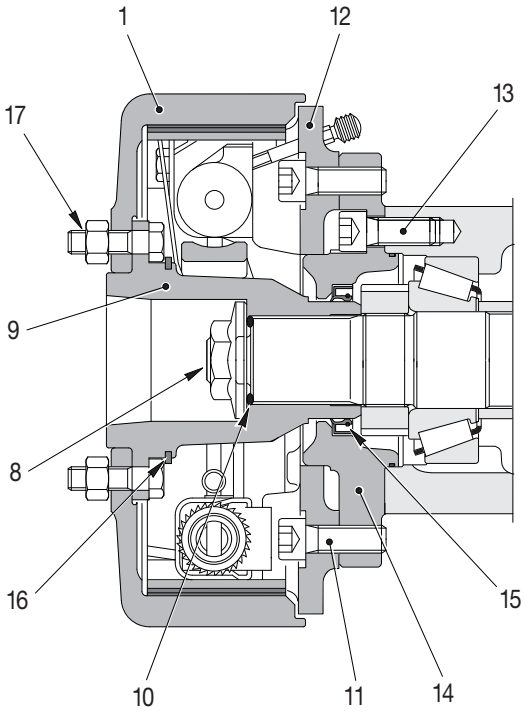
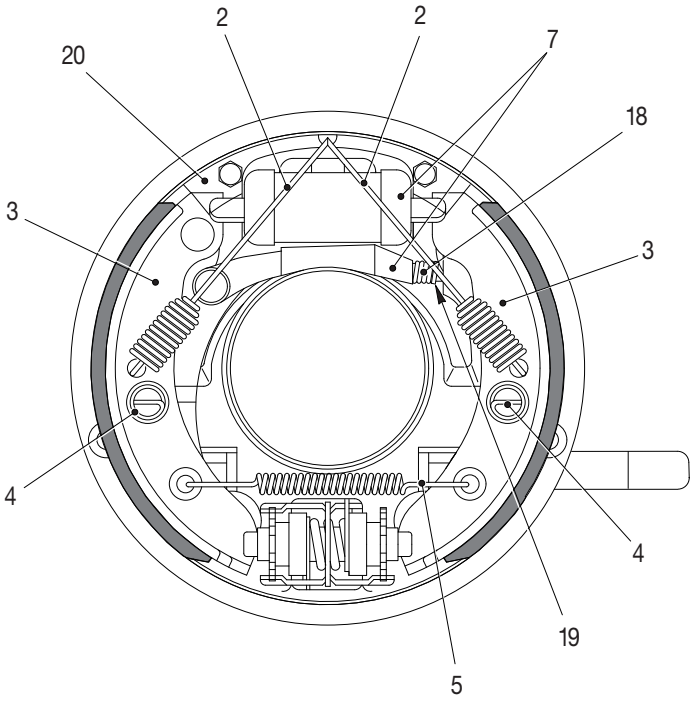


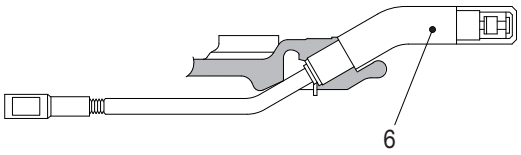
FIGURE 22: Release the check unit (7) by giving a hammer blow to the external ring.
Introduce pressure again and check that at the end of piston stroke, the check unit (7) is actually engaged onto the rod (6).

INCOMING DRUM BRAKE

EXPLODED VIEW







DISASSEMBLY

⚠DANGER

Before maintaining brakes, when the axle is installed on vehicle, follow all safety instructions in the Original Equipment Manufacturer (OEM) manual that came with the vehicle.

⚠CAUTION

Before draining oil, release the internal pressure, for details see OIL DRAINING MANDATORY PROCEDURE p. 14.

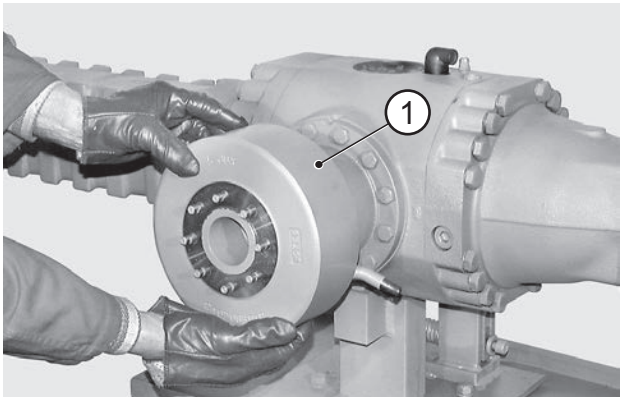


FIGURE 1: Move away the drum (1) and remove dust from the friction seals.

⚠CAUTION

Use only an aspirator and a brush.

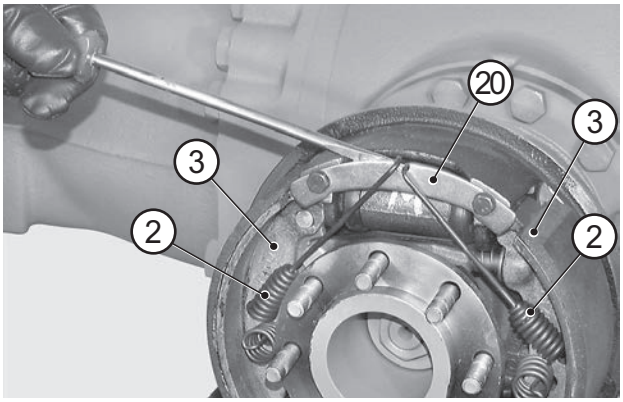


FIGURE 2: With a screwdriver, disengage the return springs (2) of shoes (3) from the stopper (20) and extract them.

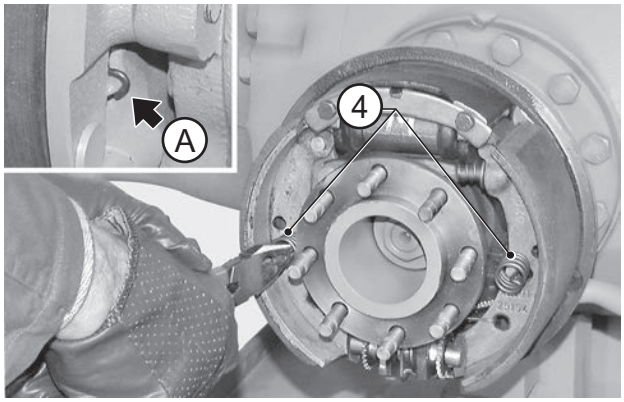


FIGURE 3: Remove the axial check springs (4) of shoes (3).

NOTE:

To remove springs, give a push and rotate so as to disengage the catch in the rear seat "A".

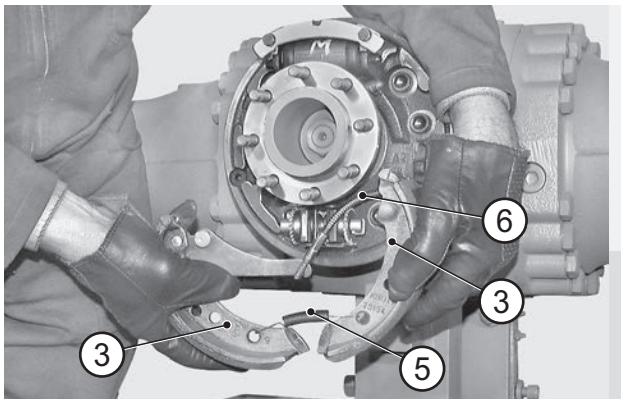


FIGURE 4: Remove the shoes (3) complete with the positioning spring (5).
Release the cable (6) for the parking brake function as well as the spring (5).

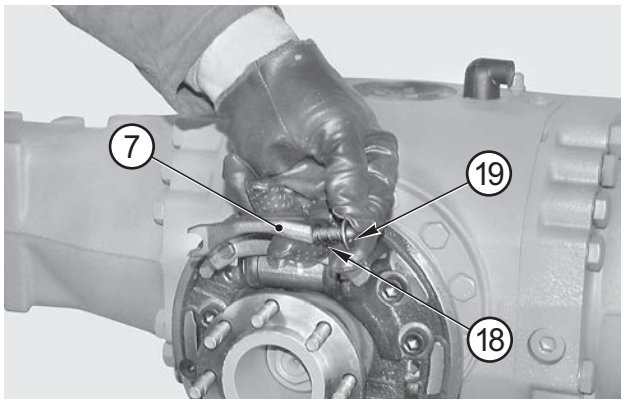


FIGURE 5: Remove the elastic compression bar set (7) (compression bar 7, spring 18, washer 19).

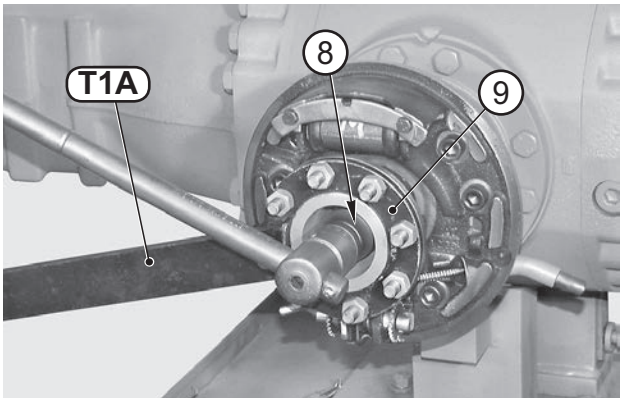


FIGURE 6: Fit tool T1A (See drawing T1 p. 88) and loosen the check nut (8) of the flange (9).

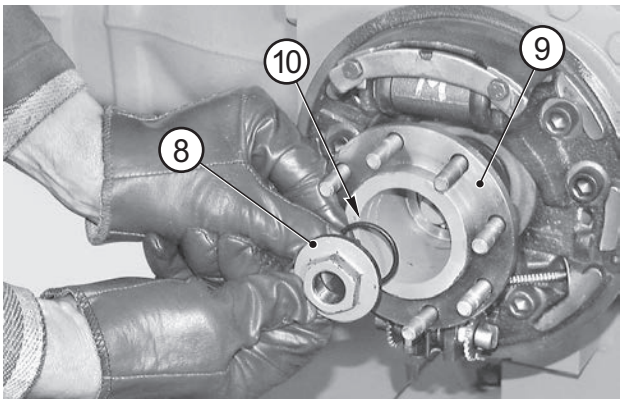


FIGURE 7: Remove parts in the following order: nut (8), o-ring (10), and whole flange (9).

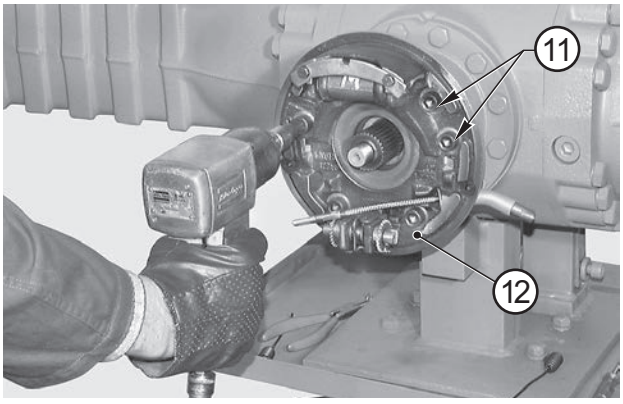


FIGURE 8: Loosen the securing screws (11) of the brake unit flange (12).

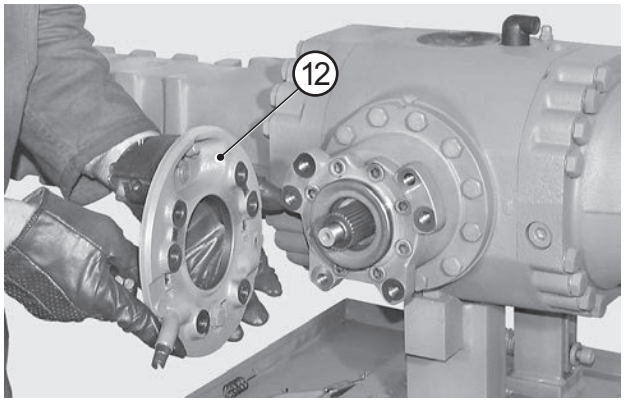


FIGURE 9: Remove the flange (12) complete with braking cylinder, clearance regulation unit, and parking function cable.

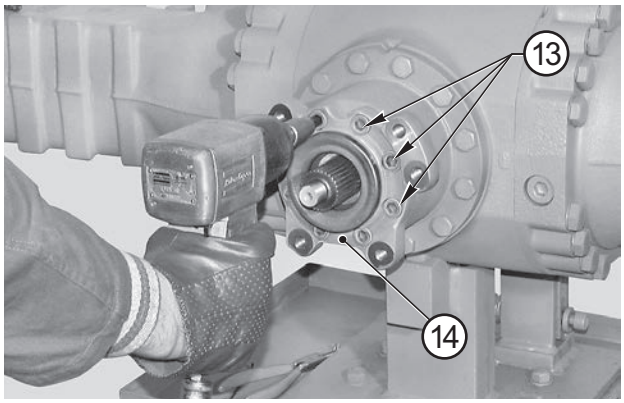


FIGURE 10: Loosen the securing screws (13) of brake support (14).

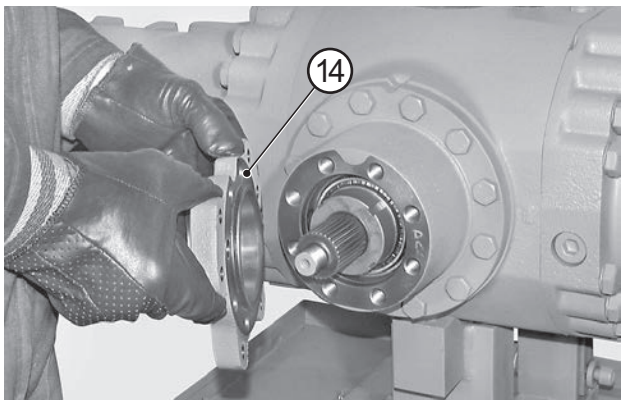


FIGURE 11: Remove the brake support (14).

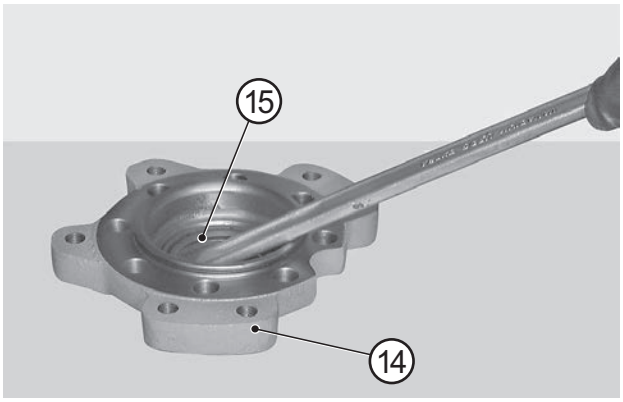


FIGURE 12: Remove the sealing ring (15) from the brake support (14).

NOTE:

Write down direction of assembly.

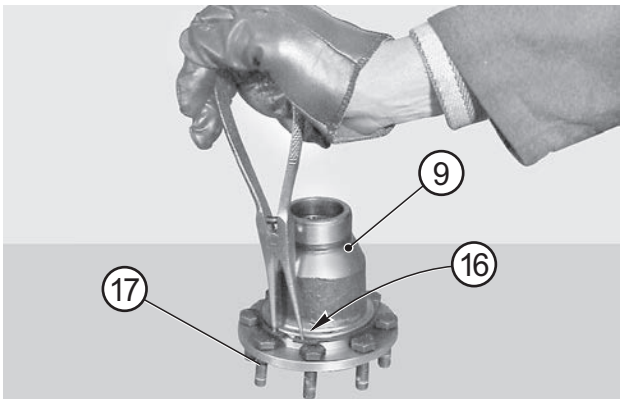


FIGURE 13: ONLY IF NECESSARY
Remove snap ring (16) and screws (17) from the flange (9).

ASSEMBLY

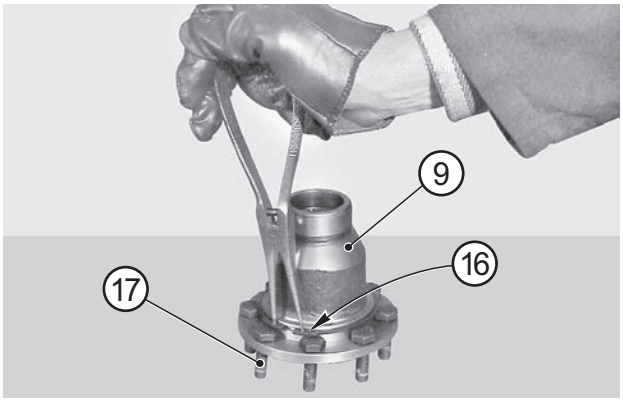


FIGURE 14: ONLY IF PREVIOUSLY REMOVED
Insert the screws (17) into the flange (9) and hold them in position with the snap ring (16).

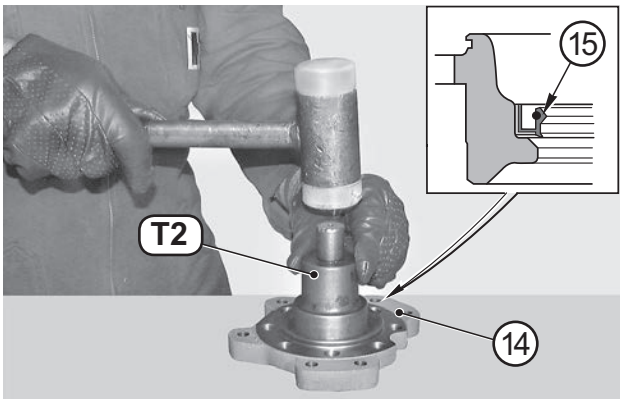


FIGURE 15: Lubricate the sealing ring (15) and, with the help of tool T2, fit it into the brake support (14).

NOTE:

Carefully check direction of assembly.

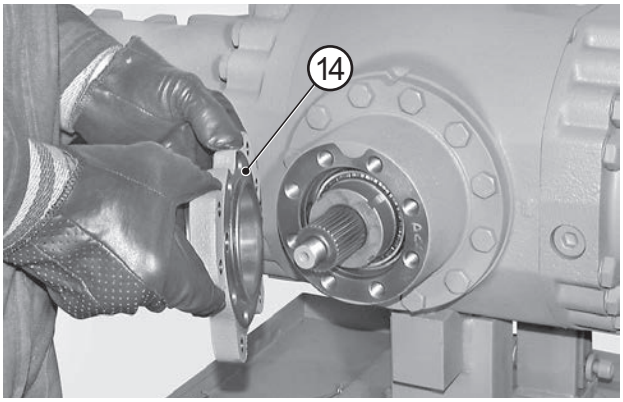


FIGURE 16: Lubricate the coupling surfaces and position the brake support (14).

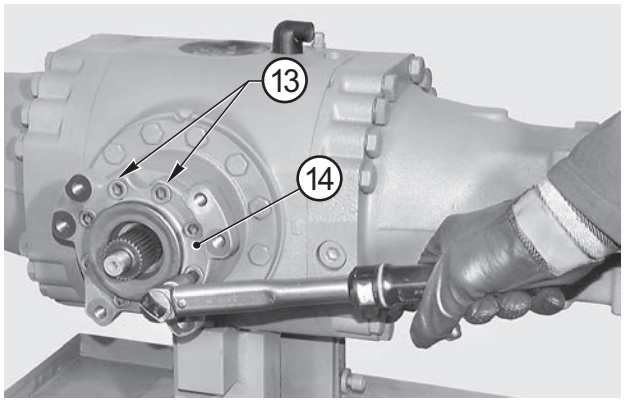


FIGURE 17: Apply Loctite 242 to the screws (13) and tighten using the criss-cross method.
Torque wrench setting: 116 - 128 N·m

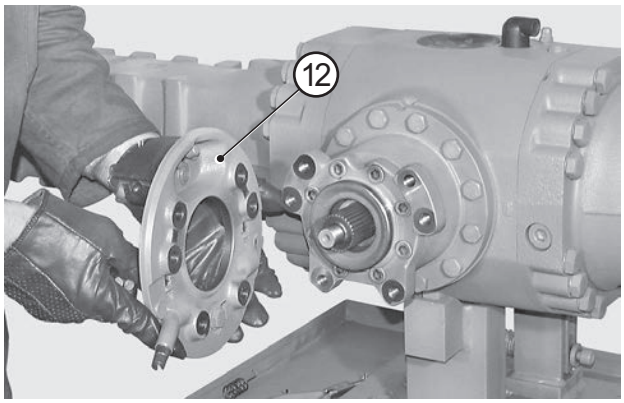


FIGURE 18: Lubricate the coupling surfaces and fit the flange of the brake unit (12).

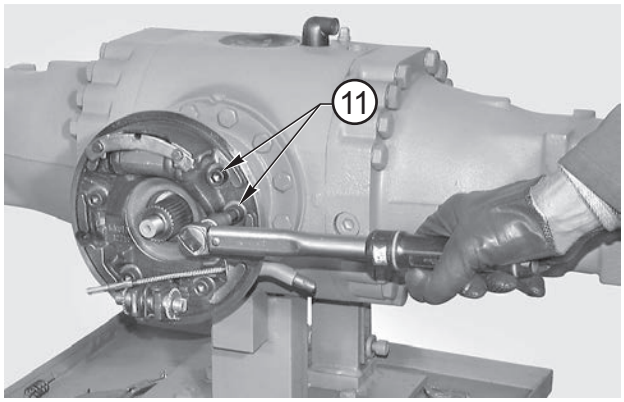


FIGURE 19: Apply Loctite 242 to the screws (11) and tighten using the criss-cross method.

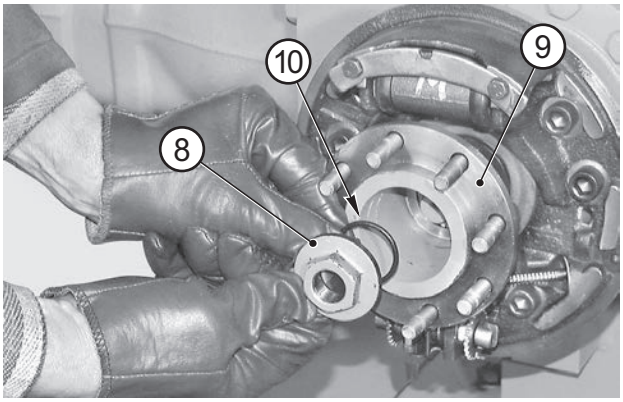


FIGURE 20: Keeping to the following sequence, install the flange (9), the o-ring (10) and the nut (8).
Apply Loctite 242 to the threaded portion of the pinion.

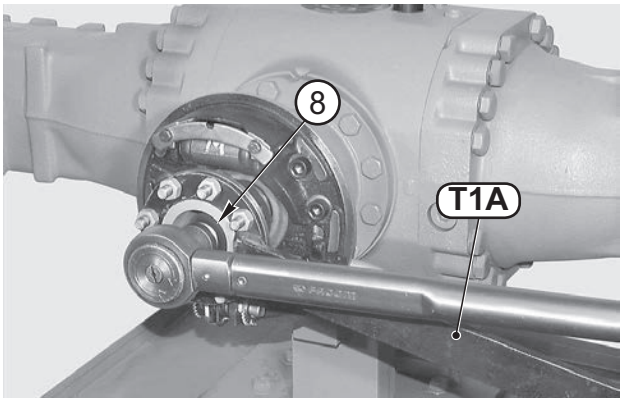


FIGURE 21: Install tool T1A (See drawing T1 p. 88) (or T1B) and tighten the nut (8).
Torque wrench setting : 280 - 310 N·m

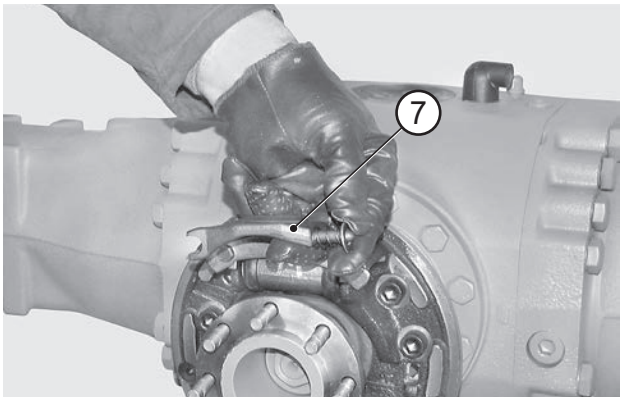


FIGURE 22: Position the elastic compression bar set (7).

NOTE:

Spring (18) and washer (19), which are part of the punch set, must be installed at a later stage.

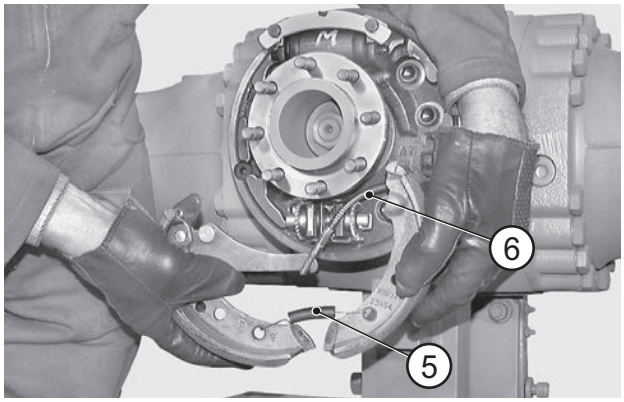


FIGURE 23: Fix the positioning spring (5) and the cable (6) to the cam of the parking function.

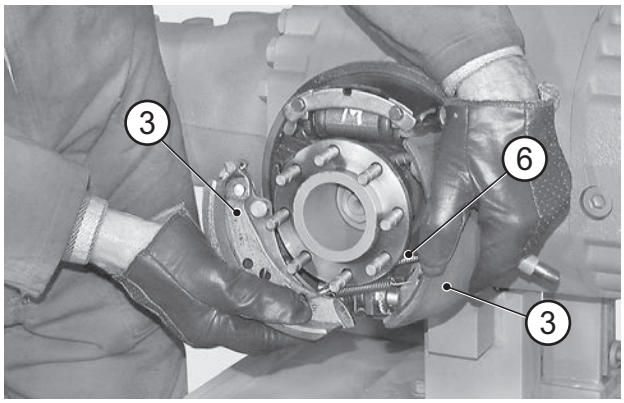


FIGURE 24: Let the cable (6) slide into the guide and position the shoe set (3) by engaging the terminals in the regulation unit and in the cylinder.

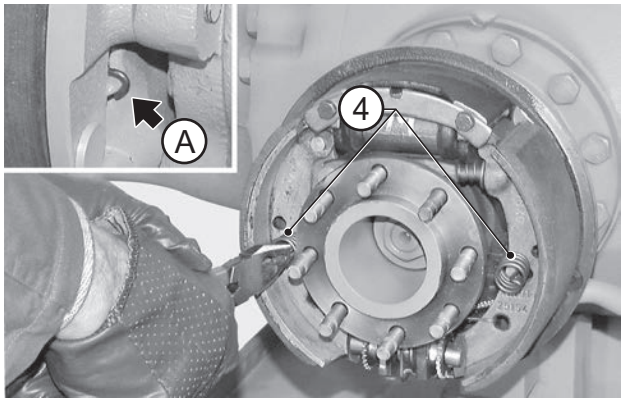


FIGURE 25: Insert the check springs (4), give a push and a torsion at the same time to engage hook "A" in the rear seat.

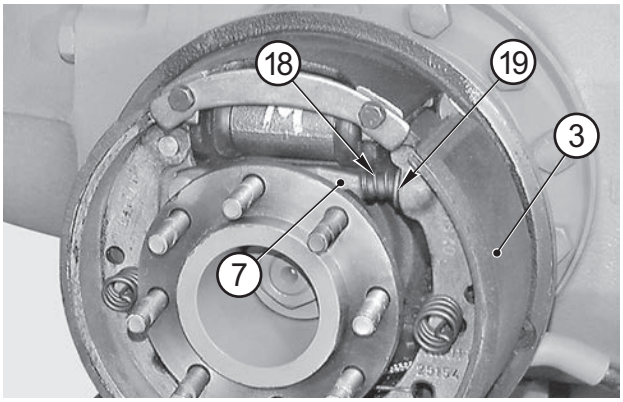


FIGURE 26: Move away the right shoe (3) and position the spring (18) and washer (19) of the elastic compression bar set (7).

NOTE:

Check that the compression bar (7) is correctly inserted in the seats of the shoes (3).

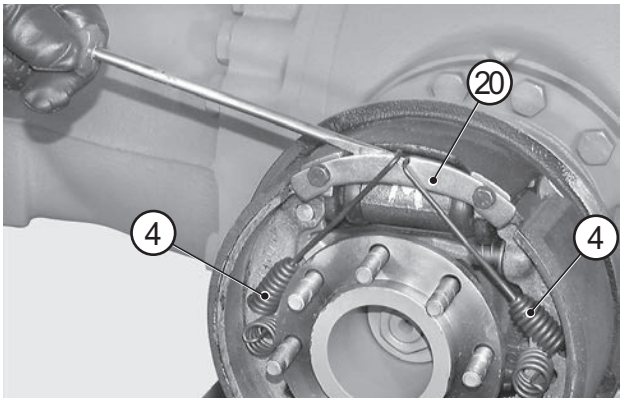


FIGURE 27: Engage the return springs (4) of the shoes (3) and hook them onto the upper bar (20).

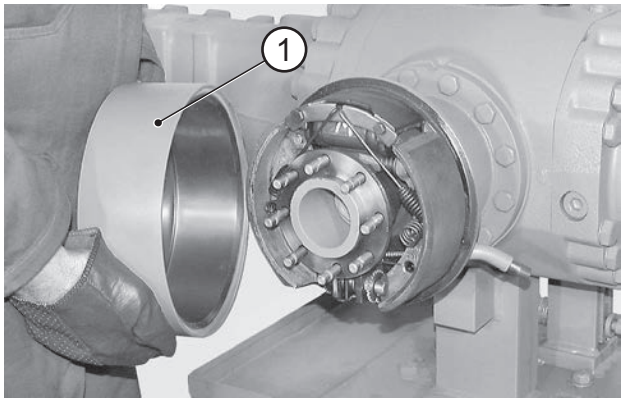


FIGURE 28: Install the drum (1).

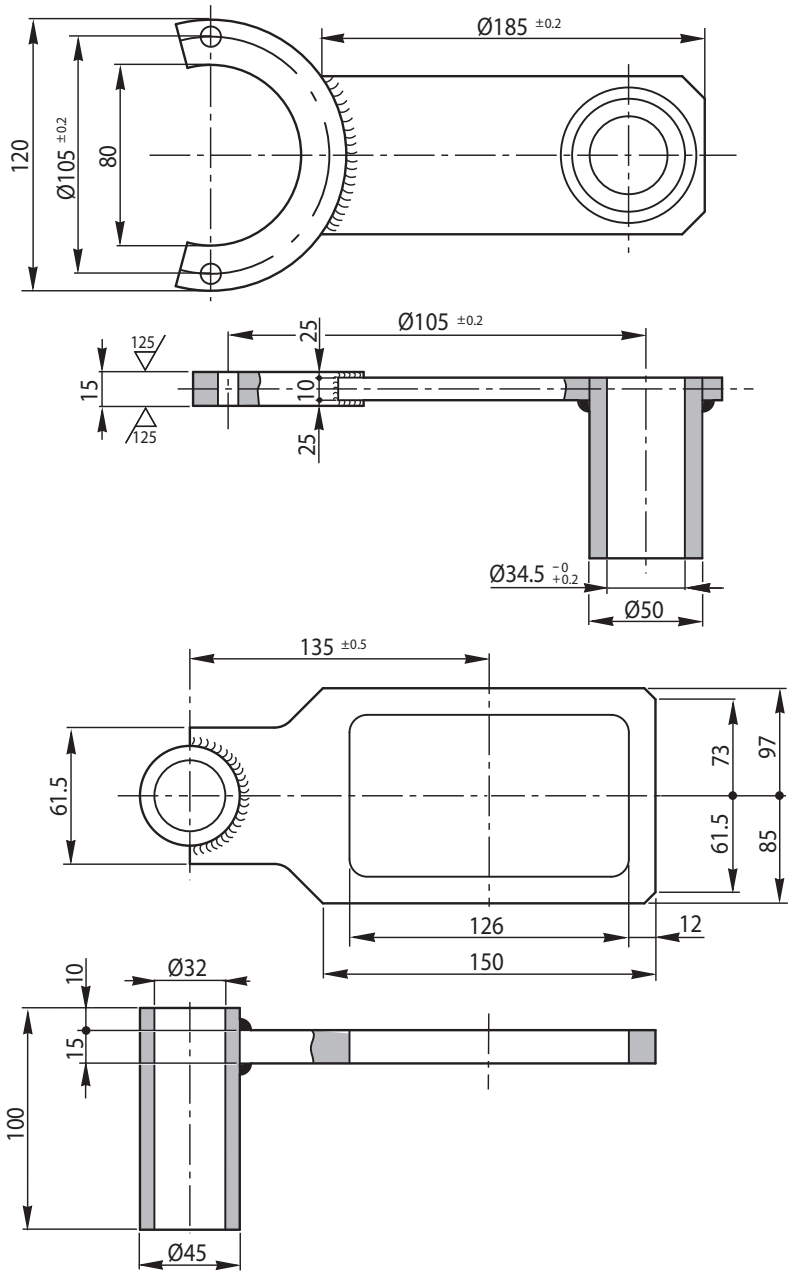
⚠CAUTION

When reassembling the unit, bleed the braking circuit and apply the brakes several times when the machine is not in motion, so as to obtain the automatic adjustment of shoes (3) clearance.

SPECIAL TOOLS

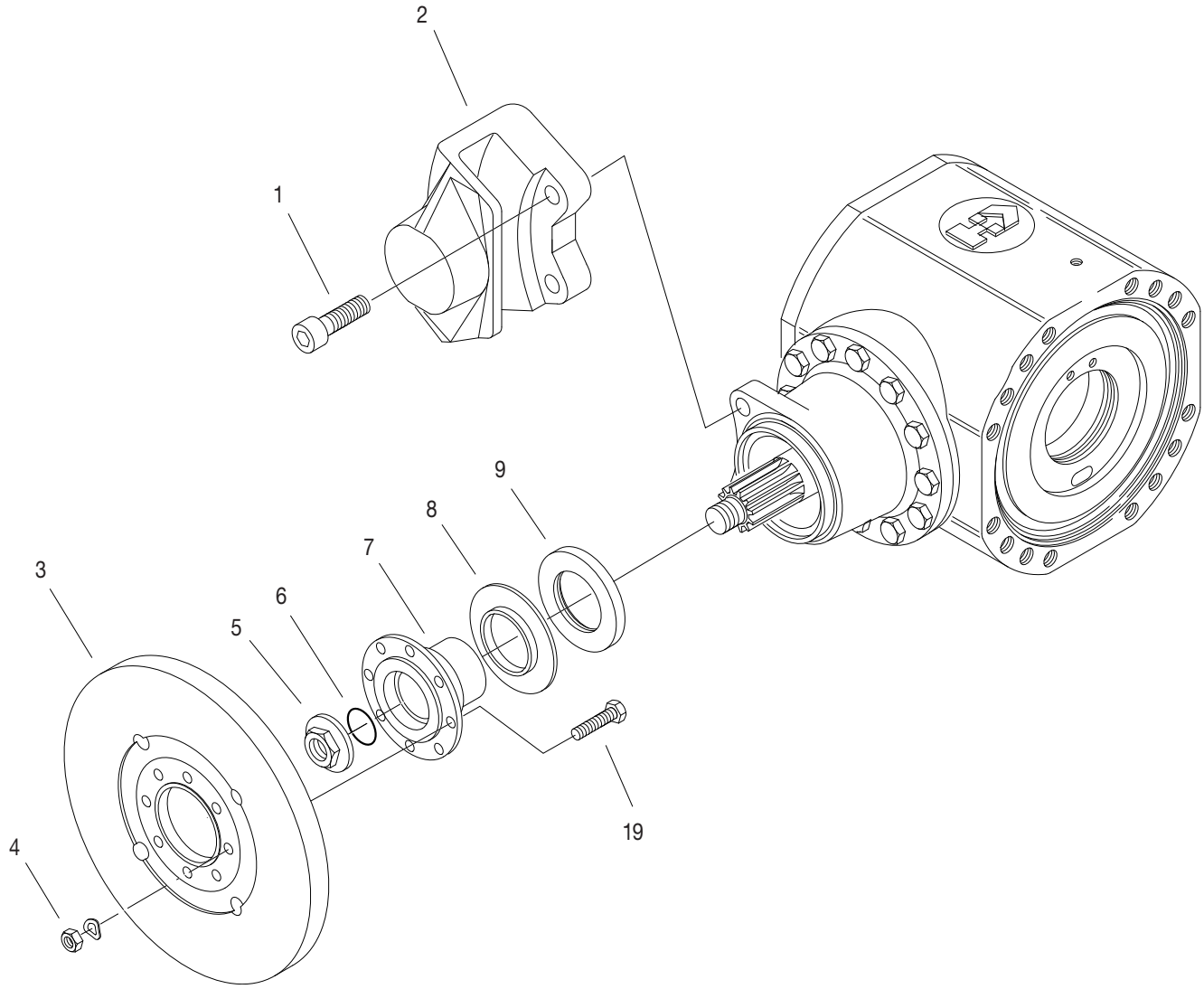
T1

P/N: 2308



BEVEL PINION SUPPORT

EXPLODED VIEW



DISASSEMBLY

⚠CAUTION

Before draining oil, release the internal pressure, for details see OIL DRAINING MANDATORY PROCEDURE p. 14.

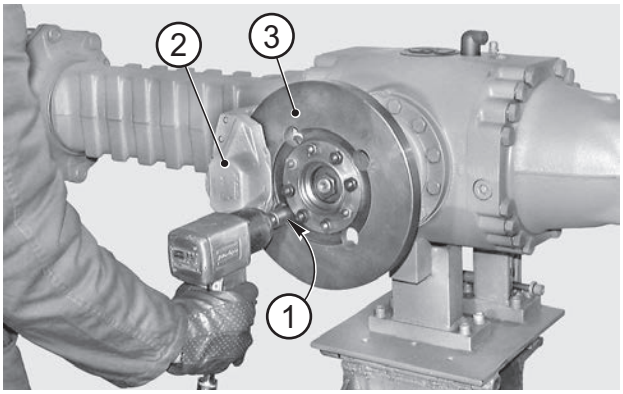


FIGURE 1: Loosen screws (1) and remove caliper unit (2).

NOTE:

Access to screws (1) is gained through the holes on the disk (3).

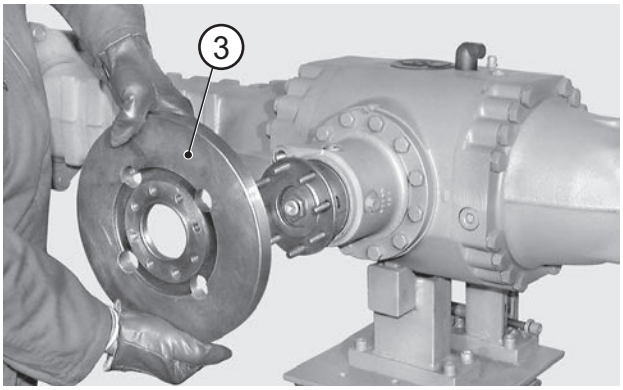


FIGURE 2: Loosen the nuts (4) and remove the disk (3). Remove the screws (19).

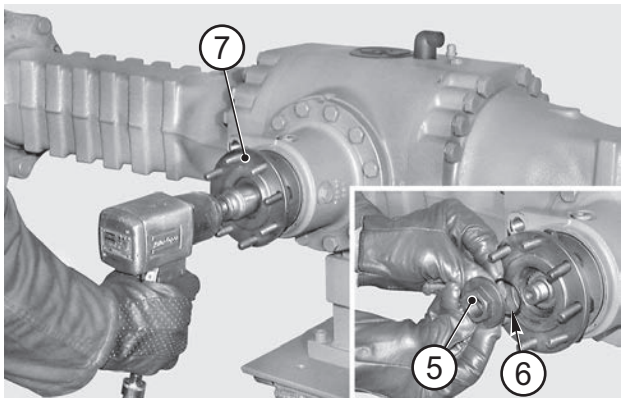


FIGURE 3: Loosen and remove the nut (5) and the o-ring (6).

NOTE:

If necessary, apply tool T1A (See drawing T1 p. 92) (or tool T1B) to the flange (7), so as to prevent pinion rotation.

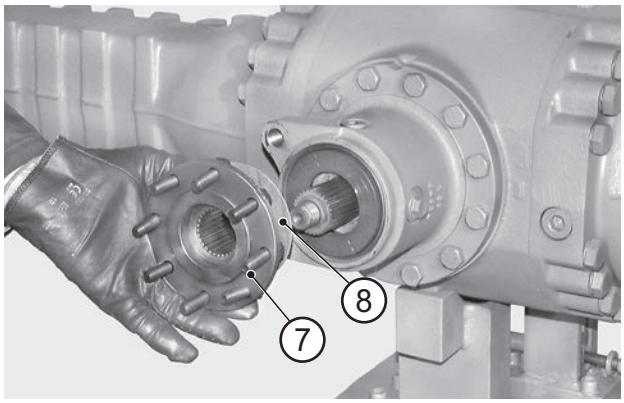


FIGURE 4: Remove the flange (7) complete with cover plate (8).

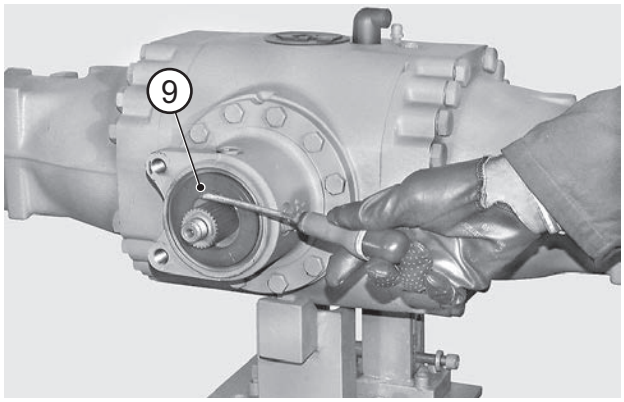


FIGURE 5: Remove the seal ring (9).

ASSEMBLY

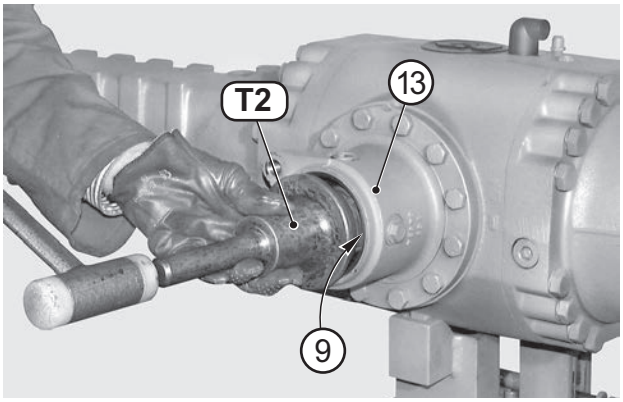


FIGURE 6: After tightening the ring nut (5), lubricate the outer surface and, using tool T2 (See drawing T2 p. 93), fit the seal ring (9) into the support (13).

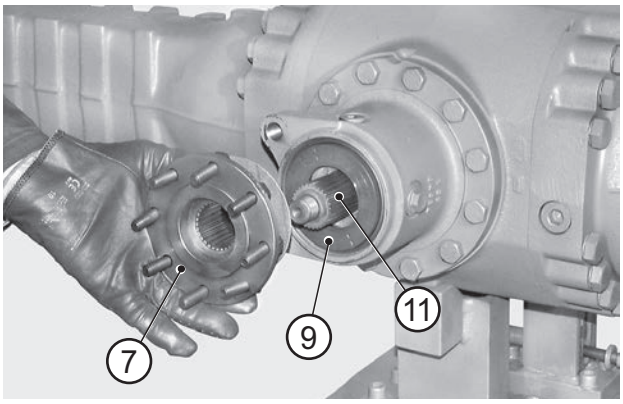


FIGURE 7: Lubricate the sealing surface of the flange (7) and fit it onto the pinion (11).

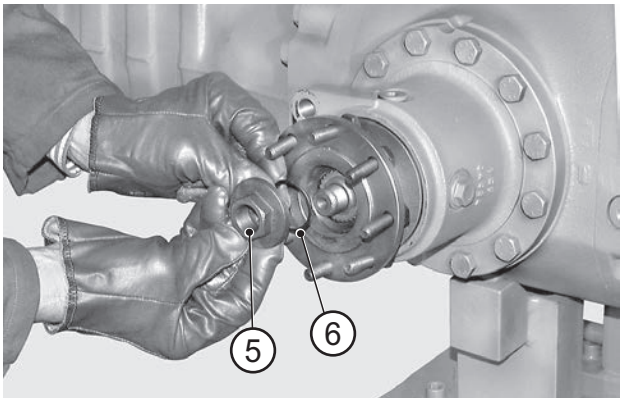


FIGURE 8: Apply Loctite 242 to pinion thread. Fit o-ring (6) and nut (5).

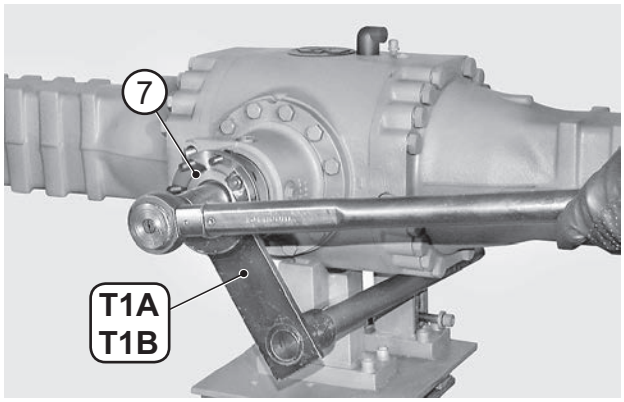


FIGURE 9: Apply tool T1A (See drawing T1 p. 92) (or T1B) to the flange (7); tighten nut with a torque wrench.
Torque wrench setting: 280 - 310 N·m

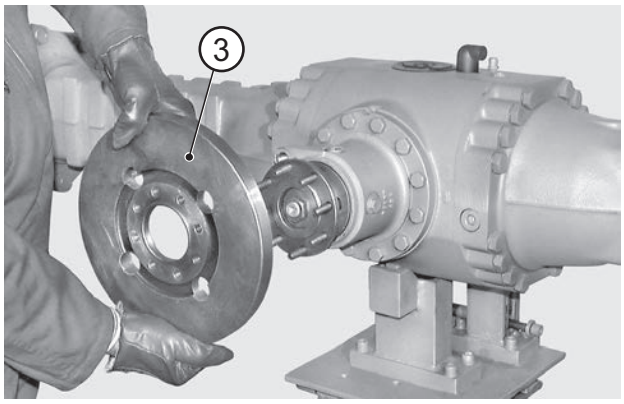


FIGURE 10: Install disk (3) and keep it into position with screws (19) and nuts (4).

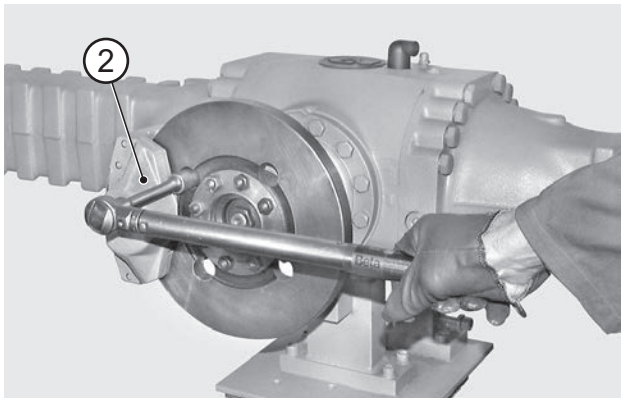
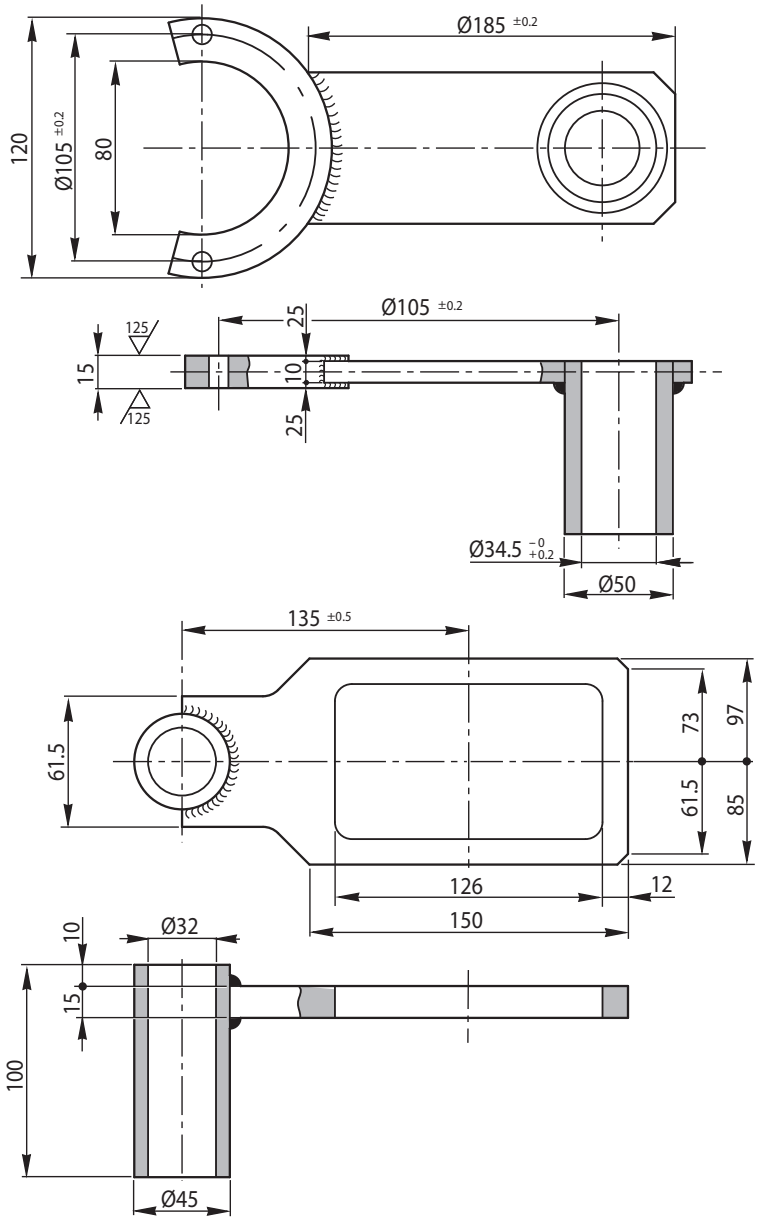


FIGURE 11: Install the caliper unit (2) and secure with screws (1) coated with Loctite 242.
Tighten using a torque wrench to a tightening torque of 302 - 334 N·m

SPECIAL TOOLS

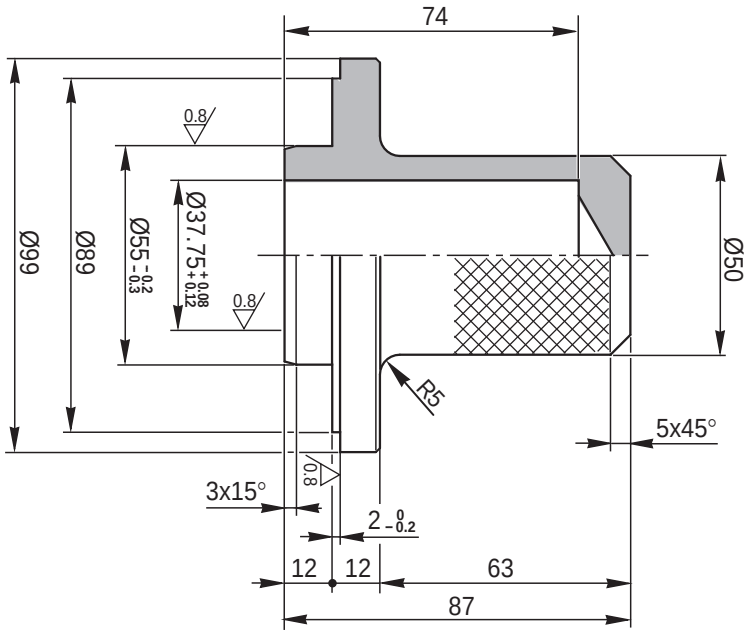
T1

P/N: 2308



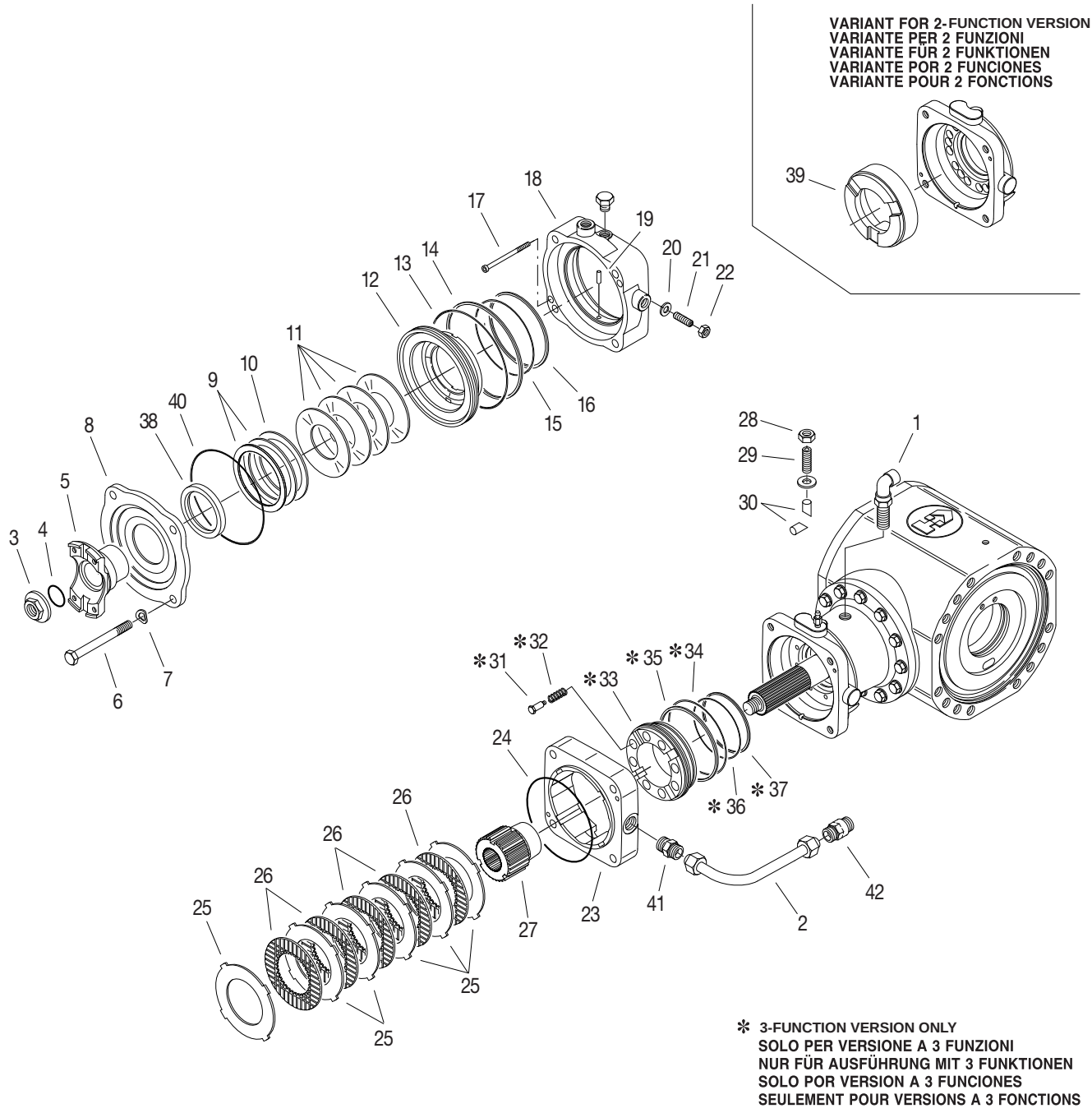
T2

P/N: 3327


74
0.8
Ø99
Ø89
Ø55 -0.2 -0.3
Ø37.75 +0.08 +0.12
0.8
Ø50
R5
5x45°
0.8
3x15°
2 0 -0.2
12
12
63
87

4" INCOMING BRAKE (2 AND 3 FUNCTION VERSIONS)

EXPLODED VIEW



DISASSEMBLY

⚠DANGER

Before maintaining brakes, when the axle is installed on vehicle, follow all safety instructions in the Original Equipment Manufacturer (OEM) manual that came with the vehicle.

⚠CAUTION

Before draining oil, release the internal pressure, for details see OIL DRAINING MANDATORY PROCEDURE p. 14.

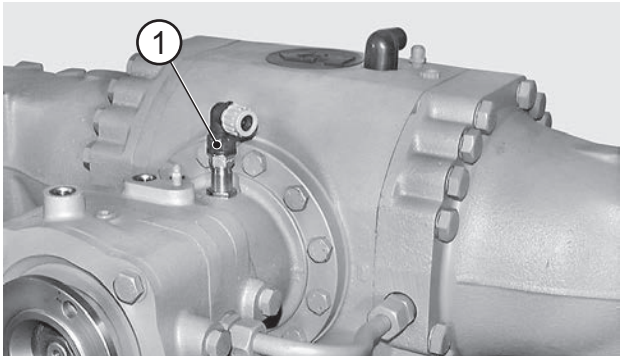


FIGURE 1: Remove electronic sensor (1), if fitted.

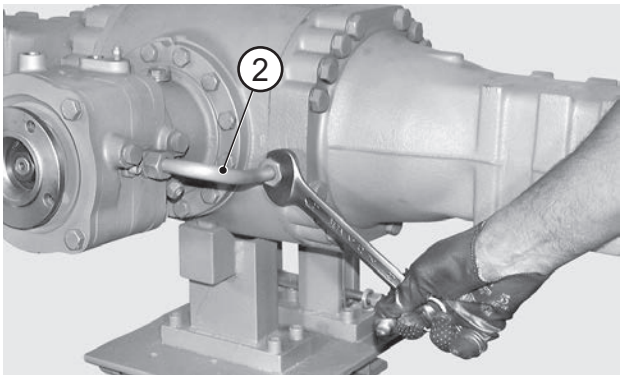


FIGURE 2: Loosen the two nuts and remove lubrication tube (2).

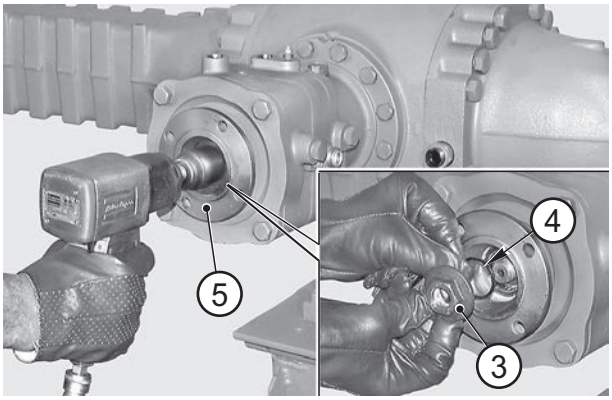


FIGURE 3: Remove nut (3), o-ring (4) and flange (5).

NOTE:

If disassembly is awkward, heat nut (3) at about 80°.

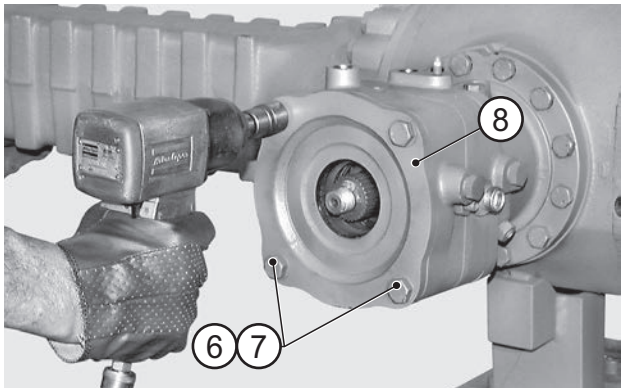


FIGURE 4: Loosen screws (6) in an alternate and criss-cross method until the action of Belleville washers (11) becomes null. Remove screws (6) and spring washers (7) of cover (8).

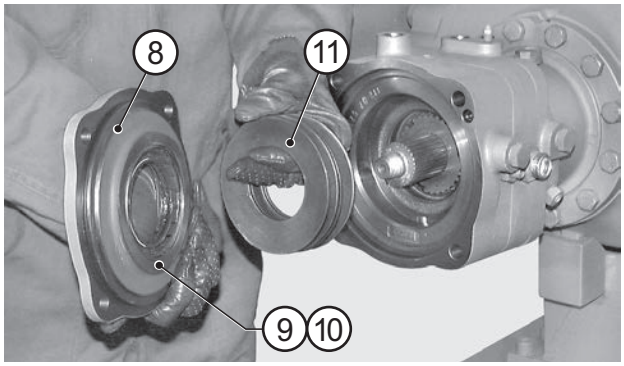


FIGURE 5: Pull out cover (8), shims (9) separating ring (10) and Belleville washers (11).

NOTE:

Take note of the assembly direction of: shims (9) and Belleville washers (11).

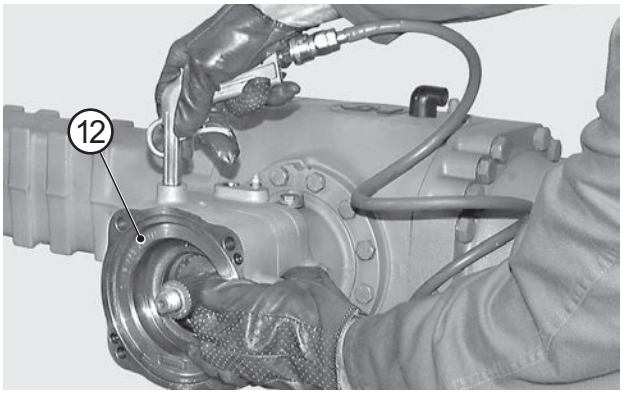


FIGURE 6: Slowly introduce compressed air through the negative brake connection point in order to extract the piston (12).

⚠CAUTION

Hold piston (12) as it may be rapidly ejected and damaged.

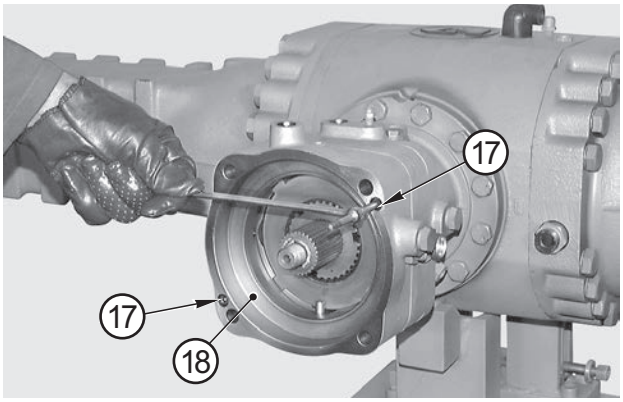


FIGURE 7: Remove check screws (17) from cylinder (18).

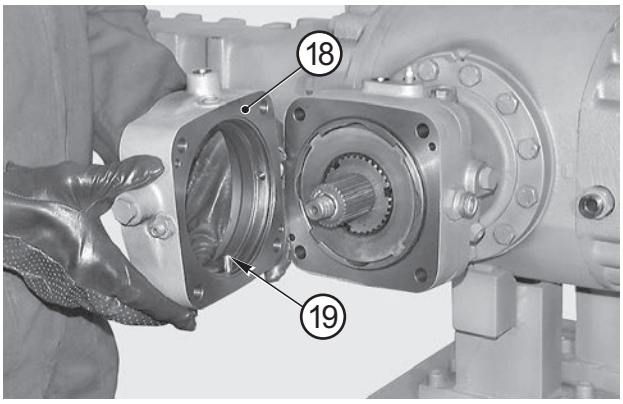


FIGURE 8: Remove cylinder (18) complete with guide pin (19) of piston (12).

NOTE:

Take note of direction of assembly.

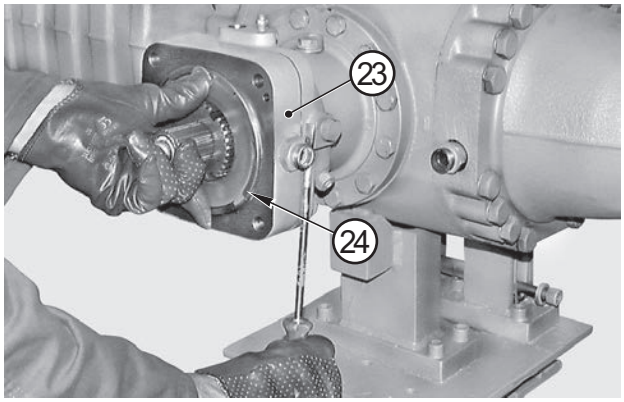


FIGURE 9: With the help of a lever, pry off the cover (23) complete with o-ring (24).

NOTE:

Thoroughly clean the face of bevel pinion support where the hub rests, check the o-ring (24) and replace it if necessary.

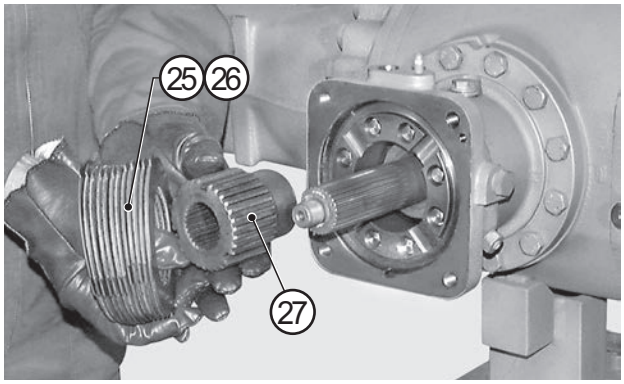


FIGURE 10: Remove friction discs (25), (26) and hub (27).

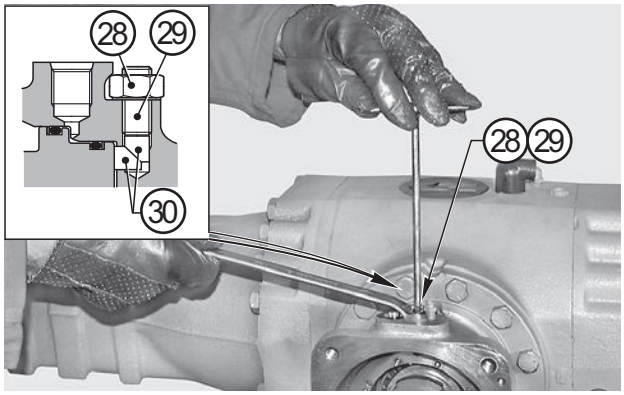


FIGURE 11: 3-FUNCTION VERSION ONLY
Loosen nuts (28) and unscrew studs (29) to retract the adjustment points (30).
ONLY IF NECESSARY. Remove points (30).

NOTE:

Loosen studs (29) in an alternate manner until the piston comes to end of backstroke.

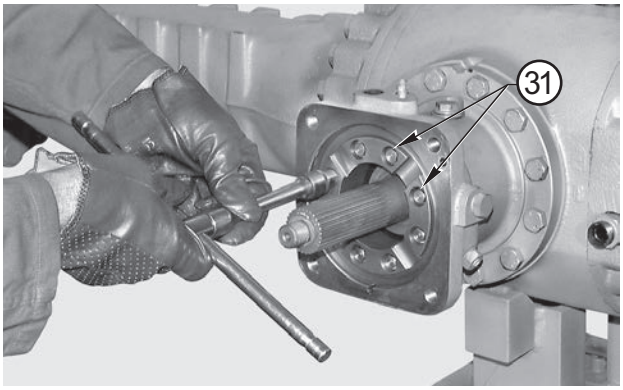


FIGURE 12: 3-FUNCTION VERSION ONLY
Loosen and remove the pin-type screws (31).

NOTE:

Loosen screws (31) in an alternate and criss-cross method.

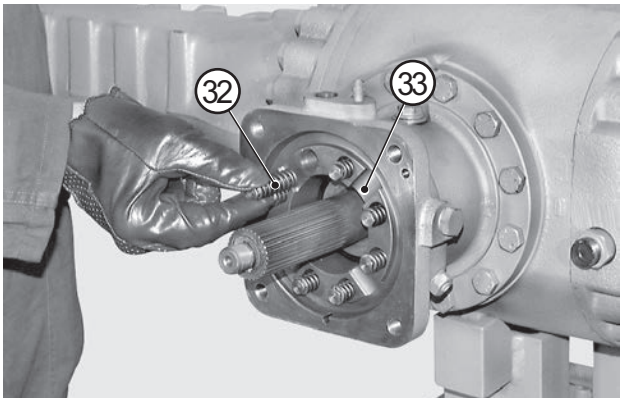


FIGURE 13: 3-FUNCTION VERSION ONLY
Remove springs (32) of piston (33) backward movement.

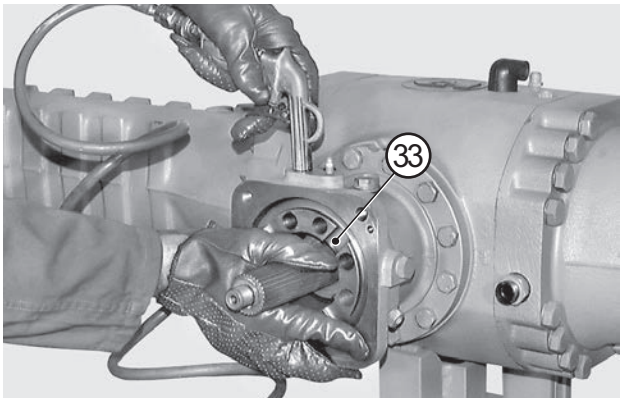


FIGURE 14: 3-FUNCTION VERSION ONLY
Slowly introduce compressed air through the connection point of the service brake to extract the piston (33).

⚠CAUTION

Hold piston (33) as it may be rapidly ejected and damaged.

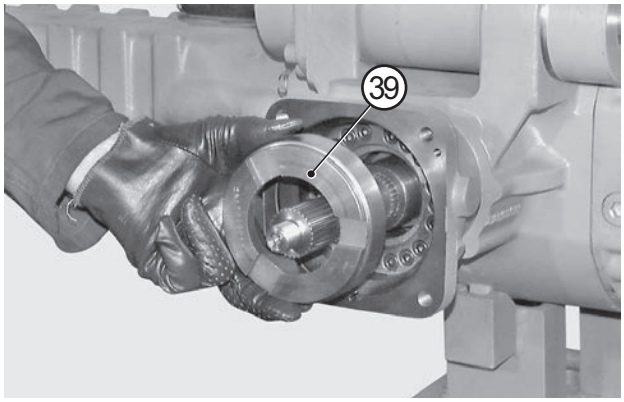


FIGURE 15: 2-FUNCTION VERSION ONLY
Remove the spacer (39).

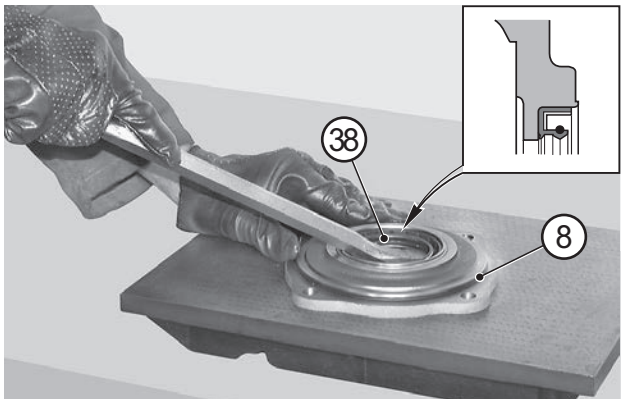


FIGURE 16: Remove sealing ring (38) from cover (8).

NOTE:

Take note of direction of assembly of ring (38) and replace ring every time the unit is disassembled.

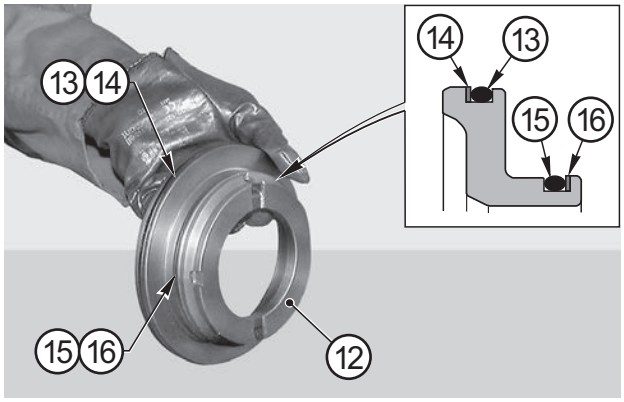


FIGURE 17: Remove sealing rings (13) and (15) and anti-extrusion rings (14) and (16) from the piston (12).

NOTE:

Sealing rings (13) and (15) and anti-extrusion rings (14) and (16) must be replaced each time the unit is disassembled.

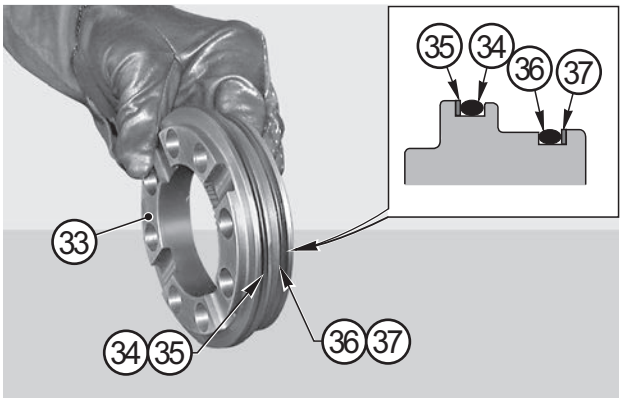


FIGURE 18: 3-FUNCTION VERSION ONLY
Remove sealing rings (34) and (36) and anti-extrusion rings (35) and (37) from piston (33).

NOTE:

Sealing rings (34), (36) and anti-extrusion rings (35), (37) must be replaced each time the unit is disassembled.

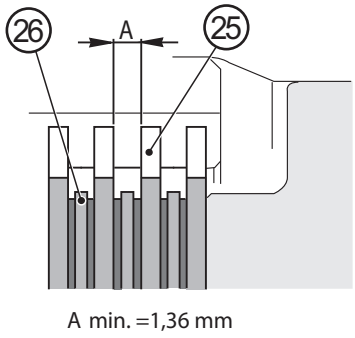


FIGURE 19: Always check the thickness of braking discs (26), even if the braking unit is being disassembled for other reasons than this.
If thickness "A" of one of the discs (26) is close to the minimum admissible size of 1.36 mm, replace the whole pack.

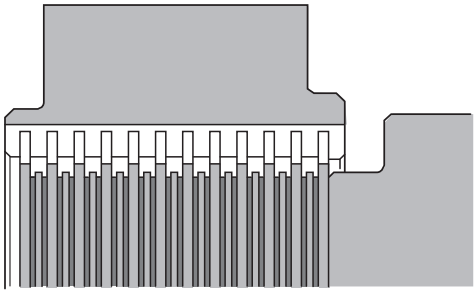


FIGURE 20: BRAKING DISCS PACK CONTENTS
The braking discs pack is comprised of: 11 braking discs and 12 steel counterdiscs.

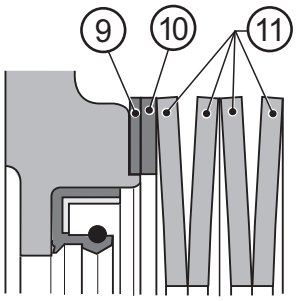


FIGURE 21: If the braking discs unit is replaced, shims (9) - which determine the preloading of Belleville washers (11) - must to be restored.

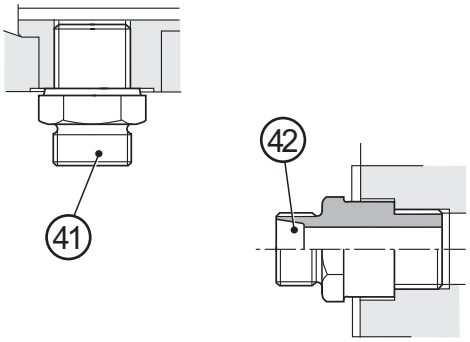


FIGURE 22: ONLY WHEN REPLACEMENT IS NECESSARY
Remove the union pieces (41) and (42) connecting the lubrication tube (2).

NOTE:

During the assembly stage, union pieces (41) and (42) must be coated with Loctite 577 and tightened to a torque wrench setting of 35 - 50 N·m.

ASSEMBLY

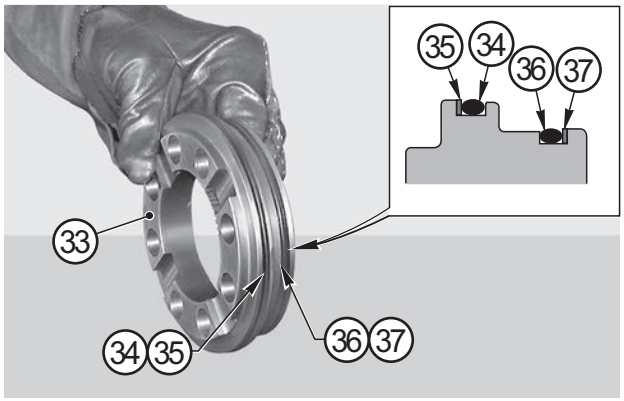


FIGURE 23: 3-FUNCTION VERSION ONLY
Fit the sealing rings (34), (36) and the anti-extrusion rings (35), (37) onto the piston (33) of the service brake.

NOTE:

Carefully check the assembly position of anti-extrusion rings.

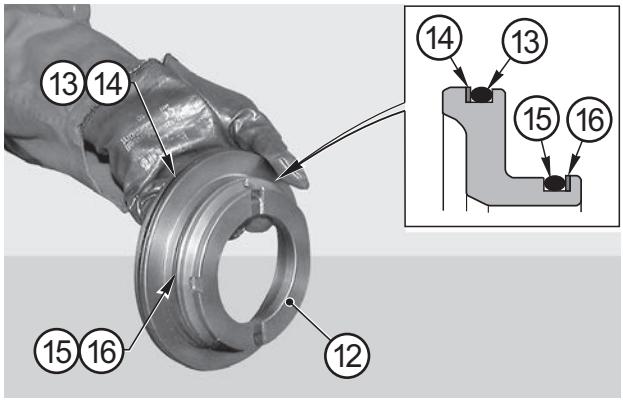


FIGURE 24: Fit the sealing rings (13), (15) and the anti-extrusion rings (14), (16) onto the piston (12) of the negative brake.

NOTE:

Carefully check the assembly position of the anti-extrusion rings.

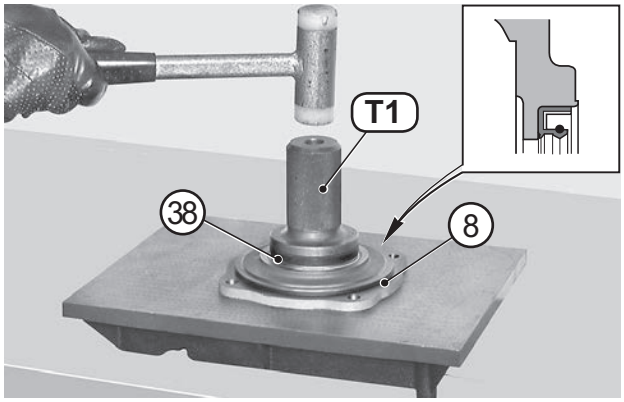


FIGURE 25: Lubricate sealing ring (38) and, using tool T1 (See drawing T1 p. 106), fit it into the cover (8).

NOTE:

Carefully check the direction of ring (38).

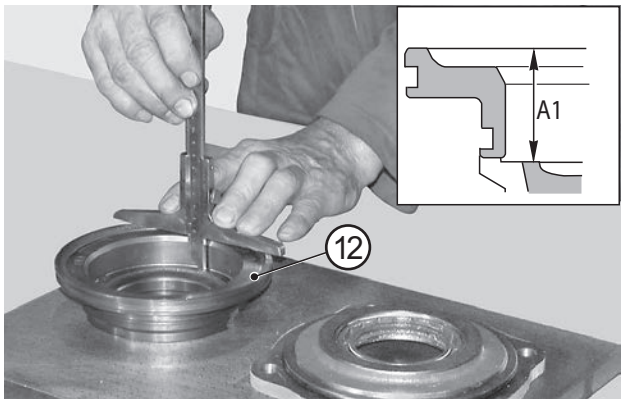


FIGURE 26: 3-FUNCTION VERSION ONLY
Measure size "A1" of piston (12) and write it down.

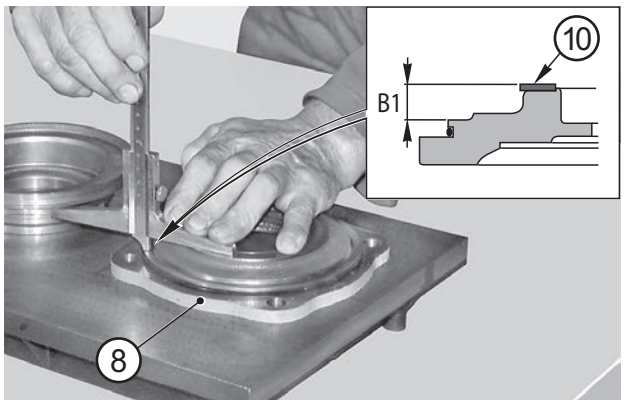


FIGURE 27: 3-FUNCTION VERSION ONLY
Fit the separating ring (10) of Belleville washers onto the cover (8), measure size "B1" and write it down.

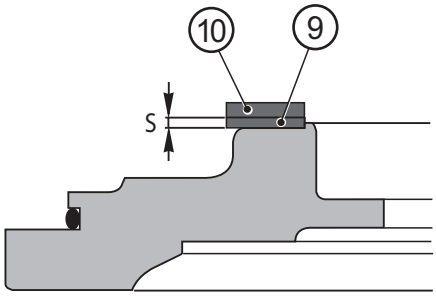


FIGURE 28: 3-FUNCTION VERSION ONLY
Using the measurements just taken, calculate thickness "S" of shims (9) as follows: S=(A1+1.5)±(B1+18.4) where:
S=Shim thickness - 1.5 mm=fixed measure of braking discs clearance - 18.4 mm=fixed measure of Belleville washers.

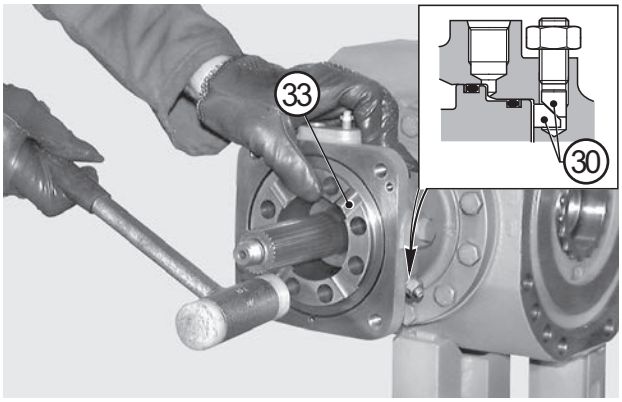


FIGURE 29: 3-FUNCTION VERSION ONLY
Lubricate the o-rings and install the whole piston (33). Orient the piston with the help of a lever and push it to end of stroke with a plastic hammer.

⚠CAUTION

Check that the adjusting stakes (30) are thoroughly inserted and make sure they perform a sliding motion in relation to each other.

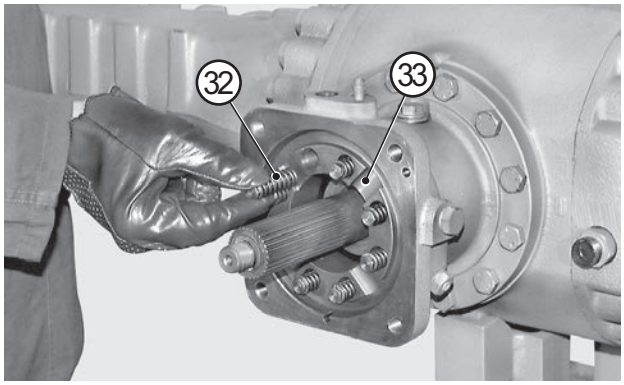


FIGURE 30: 3-FUNCTION VERSION ONLY
Insert springs (32) for piston (33) backward movement.

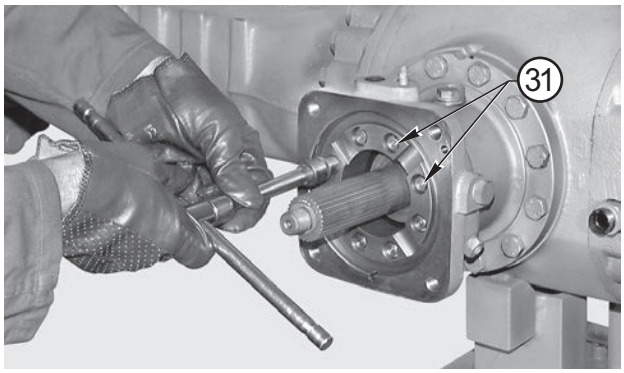


FIGURE 31: 3-FUNCTION VERSION ONLY
Apply Loctite 242 to the thread of screws (31) and tighten.

NOTE:

Tighten the screws with a normal wrench in an alternate and criss-cross method.

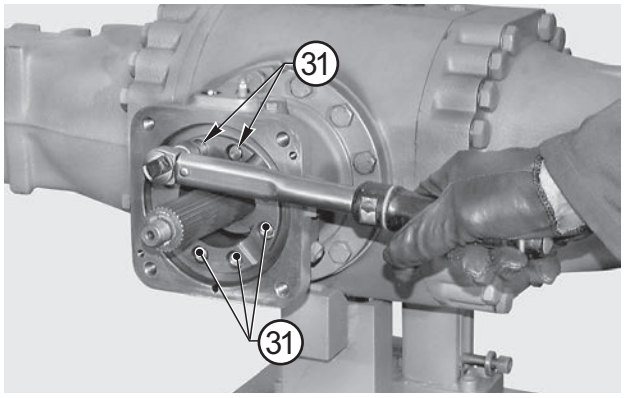


FIGURE 32: 3-FUNCTION VERSION ONLY
Lock screws (31) in a criss-cross method by using a torque wrench set to a maximum torque of 10 N·m.

⚠CAUTION

Do not exceed the specified torque setting.

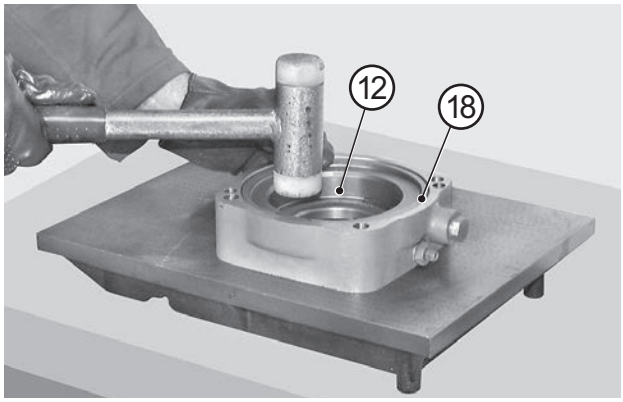


FIGURE 33: Lubricate seals (13), (15) and fit the piston (12) into the cylinder (18). Engage piston on the pin (19).
For the assembly, use a plastic hammer and push the piston (12) to end of stroke.

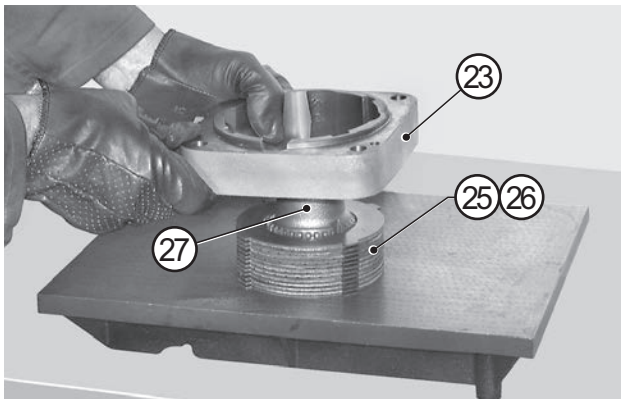


FIGURE 34: Lightly lubricate the braking discs (25), (26) and fit them onto the hub (27).
Align discs (25) and fit the cover (23).

NOTE:

The braking discs pack starts and ends with steel discs (25).

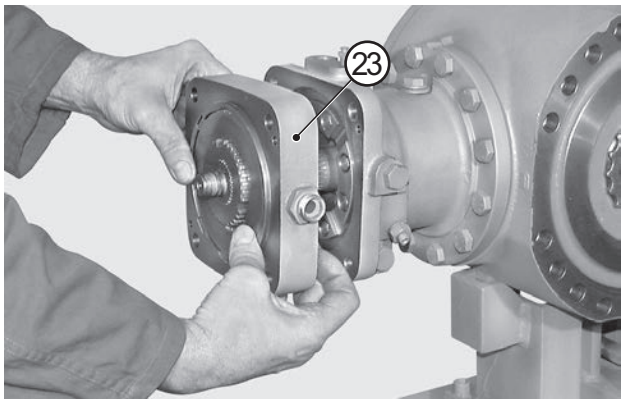


FIGURE 35: Apply Loctite 510 on the face of the cover (23).
Fit the discs-hub-cover assembly prepared in the previous stages onto the pinion and engage it.

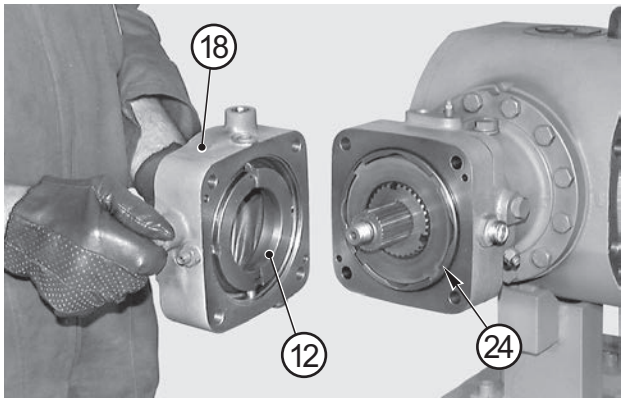


FIGURE 36: Lubricate the o-ring (24) and fit cylinder (18) complete with piston (12).

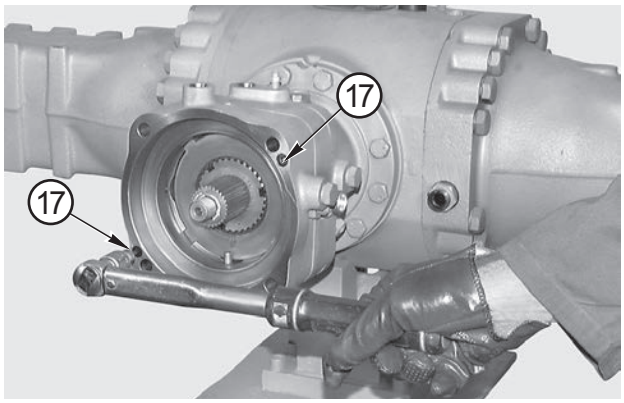


FIGURE 37: Introduce screws (17) and tighten in a criss-cross method: use a torque wrench setting of 9.5 - 10.5 N·m.

NOTE:

Before giving the final tightening, align the external surfaces of the components.

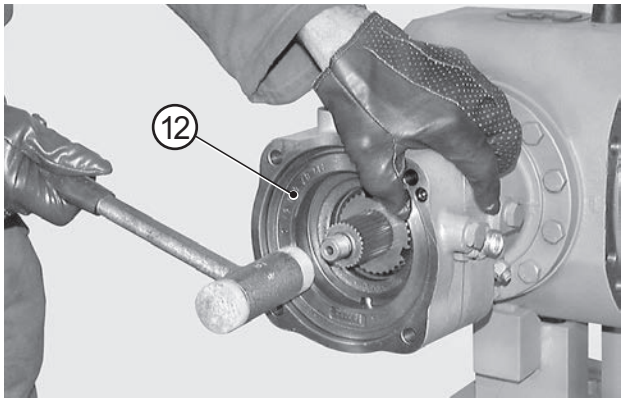


FIGURE 38: 3-FUNCTION VERSION ONLY
Using a plastic hammer, push the piston (12) to the end of stroke.

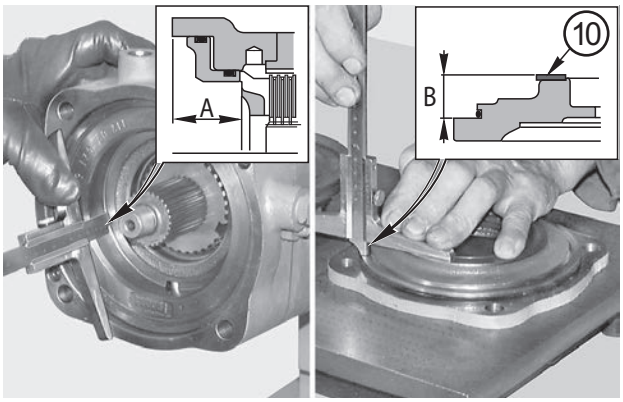


FIGURE 39: 2-FUNCTION VERSION ONLY
Fit the separating ring (10) of Belleville washers onto the cover (8), measure size "B" and write it down.
Measure size "A" which you will need for calculating the shims (9) according to the following:
S=A±(B+18.4) where: S=Shim thickness - 18.4 mm=fixed measure of Belleville washers.

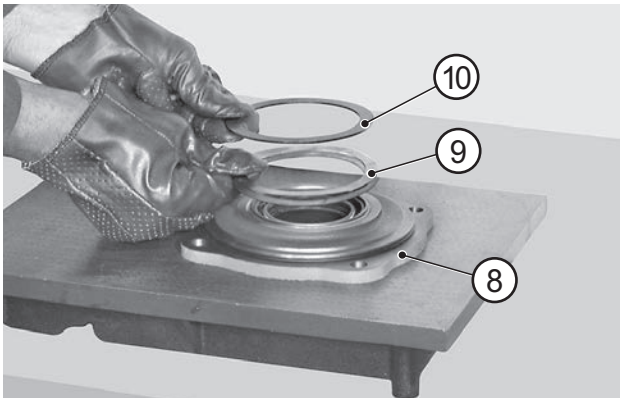


FIGURE 40: Lightly lubricate the shims (9) required according to calculations and the separating ring (10) of the Belleville washers.
Fit shims and ring on the cover (8).

NOTE:

Position the larger shim so that it leans against the cover.

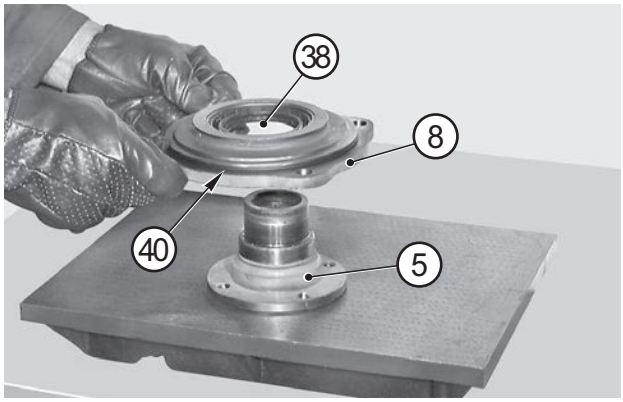


FIGURE 41: Check the state of the o-ring (40).
Lubricate sealing ring (38) and fit flange (5) into the cover (8).

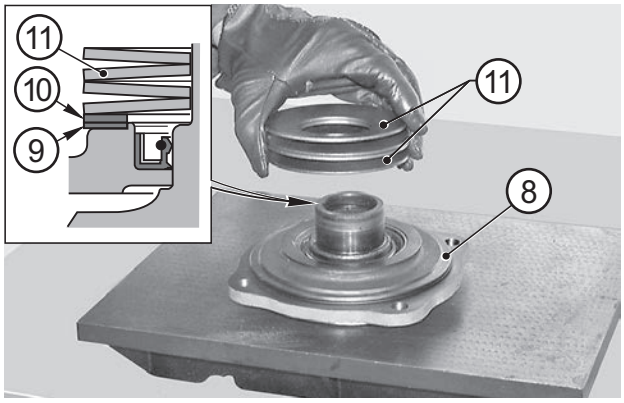


FIGURE 42: Fit the Belleville washers (11) onto the cover (8), thoroughly checking washers orientation.

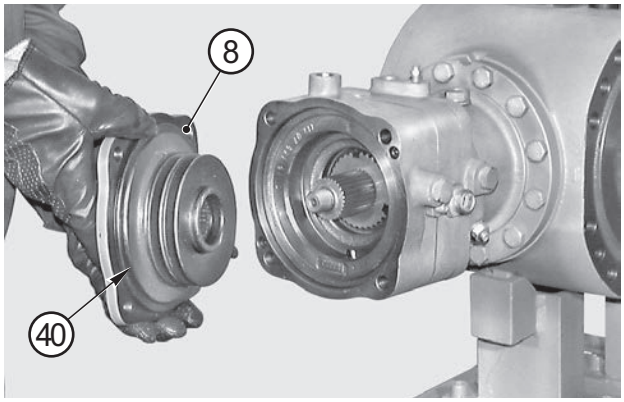


FIGURE 43: Lubricate the o-ring (40) and install the cover assembly (8).

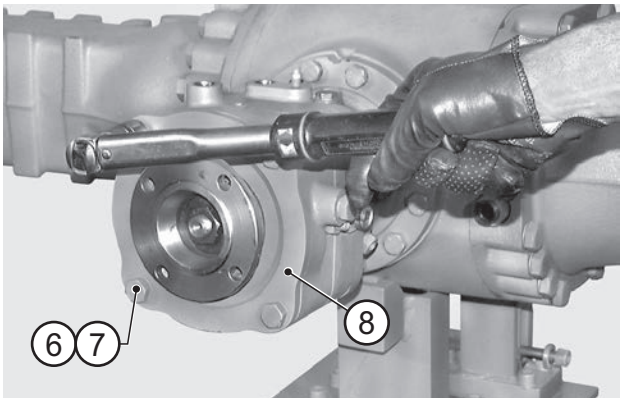


FIGURE 44: Fit screws (6) and washers (7); lock the cover with a torque wrench setting of 116 - 128 N·m.

NOTE:

Tighten in an alternate and criss-cross method.

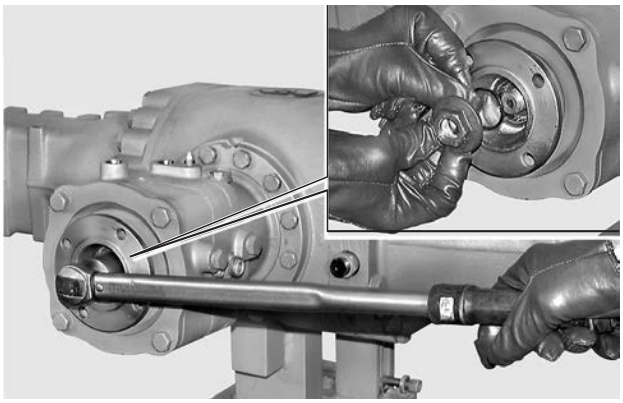


FIGURE 45: Apply Loctite 242 to the threaded portion of the pinion, fit o-ring (4) and nut (3); tighten the nut with a torque wrench set to 280 - 310 N·m.

NOTE:

Use tools T2 (See drawing T2 p. 106) T3 (See drawing T3 p. 107).

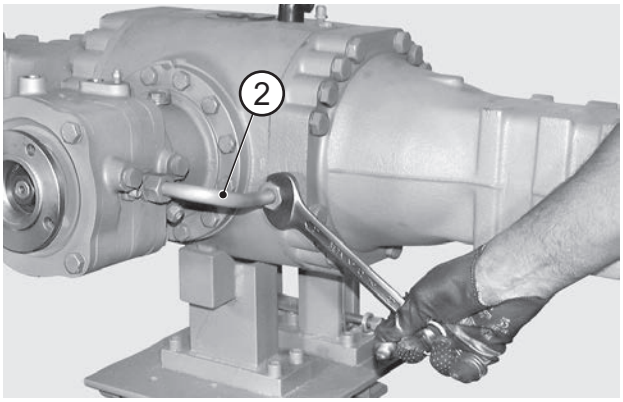


FIGURE 46: Install the lubrication tube (2).

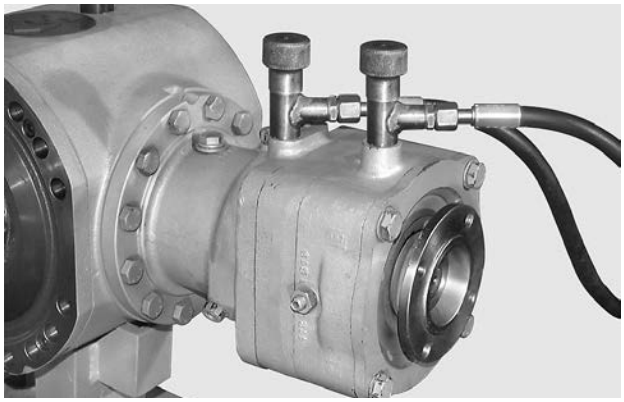


FIGURE 47: 3-FUNCTION VERSION ONLY
Connect the service and negative brakes to an external pump; introduce pressure up to a value of 20 - 25 N·m.

NOTE:

Check that pressure is kept stable for at least 5 minutes and make sure there are no leaks.

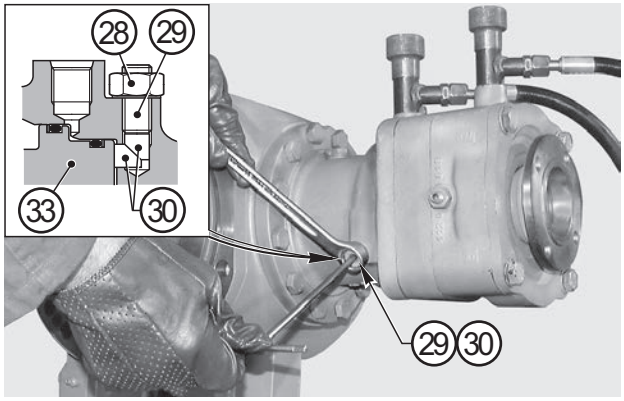


FIGURE 48: 3-FUNCTION VERSION ONLY
Screw studs (29) until pins (30) position themselves against the piston (33), then unscrew studs by one turn to obtain a 1.5 mm stroke.
Lock studs (29) into position with the nuts (28) tightened at 15 N·m.
Release pressure.

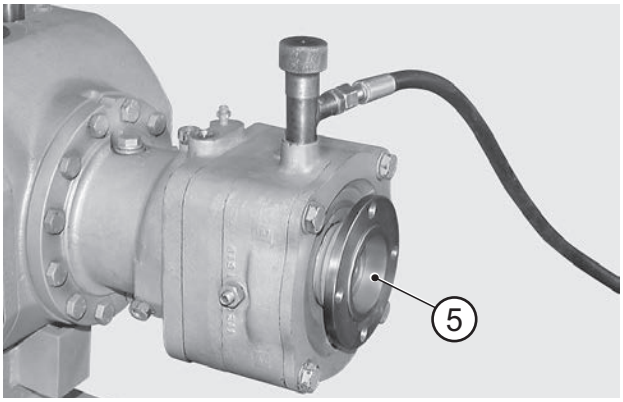


FIGURE 49: Check negative brake release by introducing a pressure of 16 - 35 bar and by manually rotating the flange (5). Release pressure.

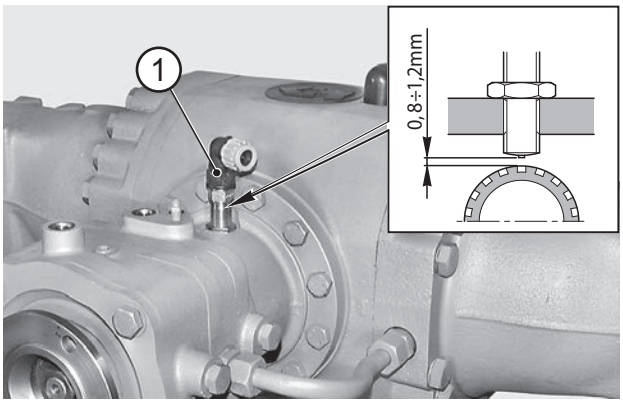


FIGURE 50: Fit the electronic sensor (1) and screw it up to the limit stop. Unscrew sensor by 3/4 turn and lock into position with nut. Locking torque: maximum 30 N·m.

⚠CAUTION

Do not exceed the specified torque setting.

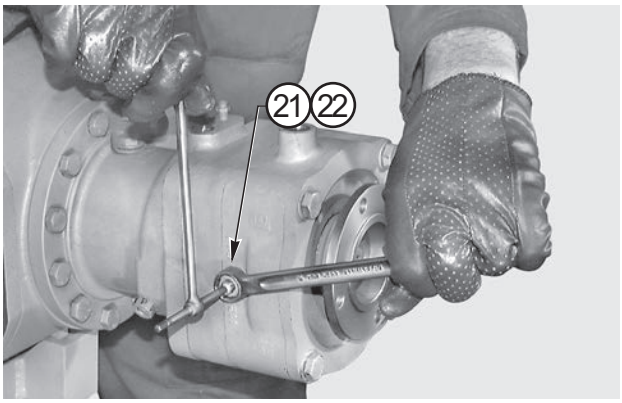


FIGURE 51: To release the negative brake during an emergency, (lack of pressure due to vehicle breakdown), loosen nuts (22) and screw studs (21) in an alternate and gradual manner until you notice some preloading;
continue by giving another 1.5 turns.

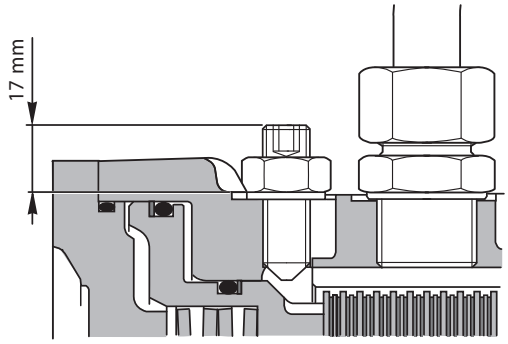
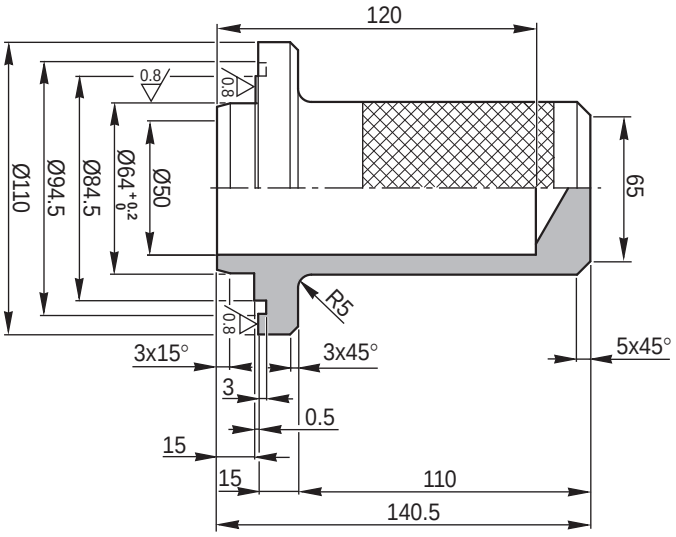


FIGURE 52: When the emergency is over, loosen the studs in an alternate manner until a 17 mm projection is obtained; lock into position with the nuts (22) tightened to 15 N·m.

SPECIAL TOOLS

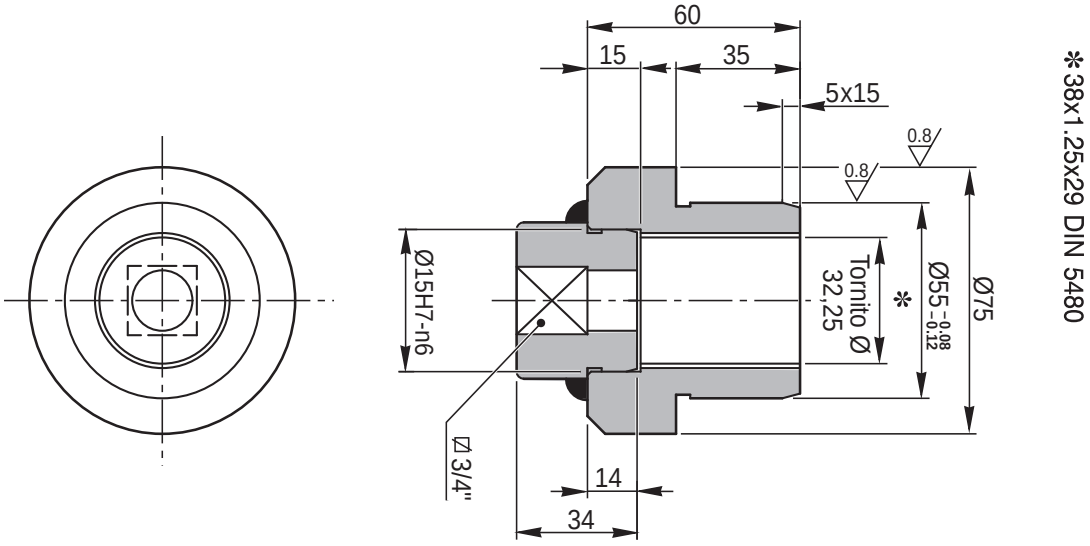
T1

P/N: 3739



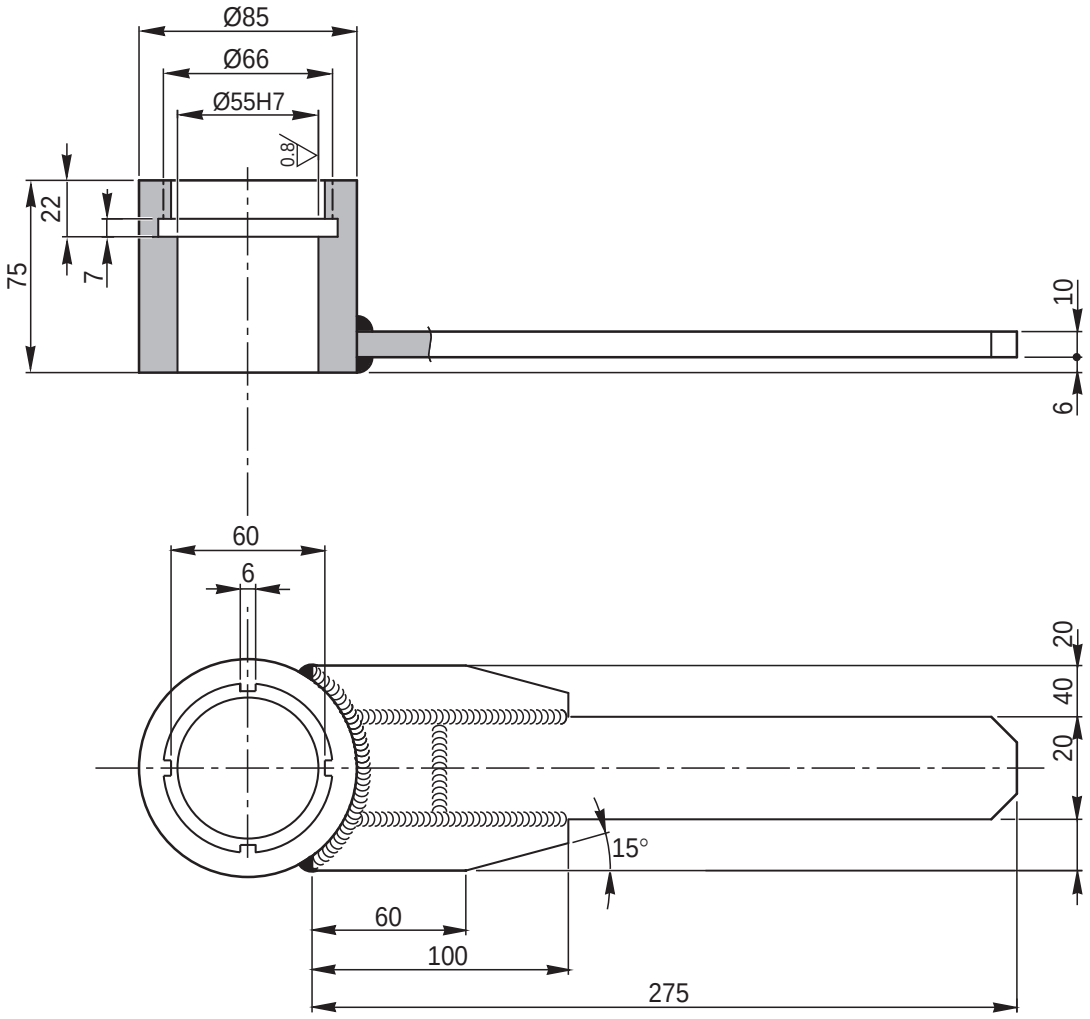
T2

P/N: 3317/3



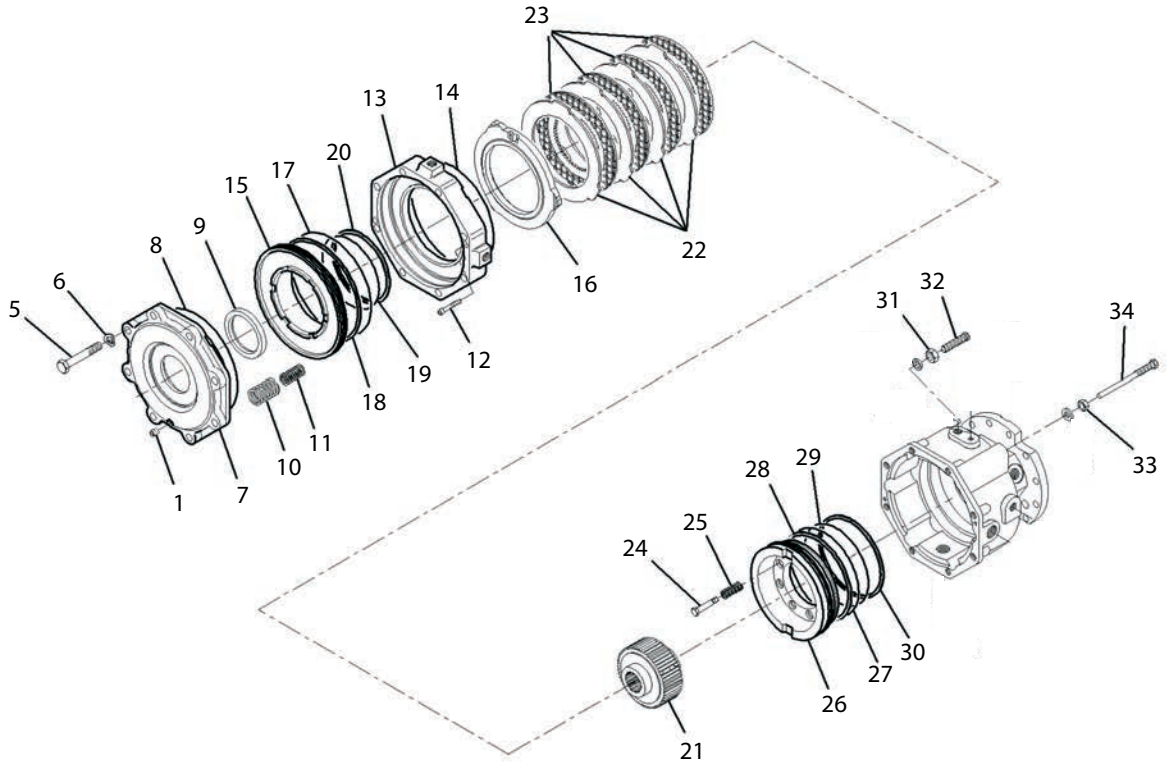
T3

P/N: 3317/A



7" COMBINED BRAKE

EXPLODED VIEW



DISASSEMBLY

⚠DANGER

Before maintaining brakes, when the axle is installed on vehicle, follow all safety instructions in the Original Equipment Manufacturer (OEM) manual that came with the vehicle.

⚠CAUTION

Before draining oil, release the internal pressure, for details see OIL DRAINING MANDATORY PROCEDURE p. 14.

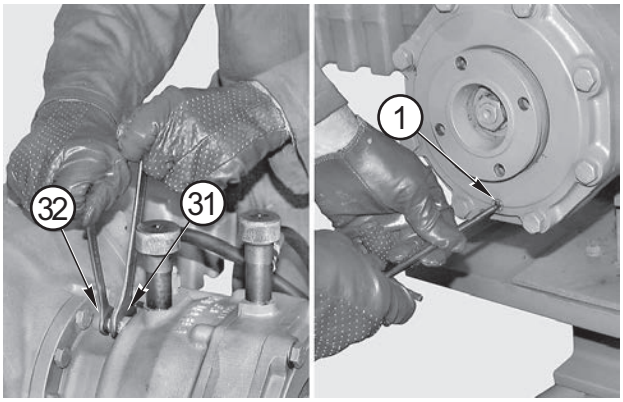


FIGURE 1: Loosen nuts (31) and unfasten screws (32) in sequence.
Remove the front plug (1) to drain the residual lubricating oil.

⚠CAUTION

Apply oil recovery tubes to the hydraulic connection points.

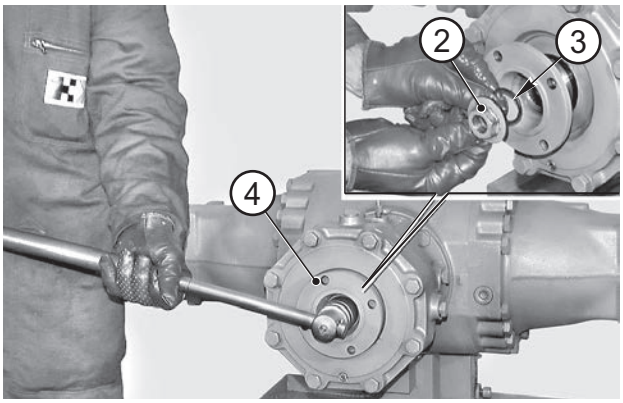


FIGURE 2: Loosen and remove nut (2), o-ring (3) and flange (4).
If disassembly proves to be awkward, heat the nut (2) at about 80° C.
If necessary, use one of the T1 (See drawing T1 p. 118) tools.

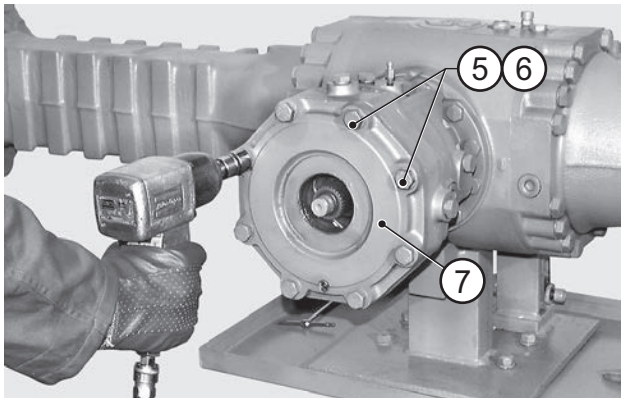


FIGURE 3: Loosen and remove screws (5) and spring washers (6).

⚠CAUTION

Gradually loosen screws in a criss-cross manner.

Leave two of the screws in place to hold cover in place to prevent it from falling.

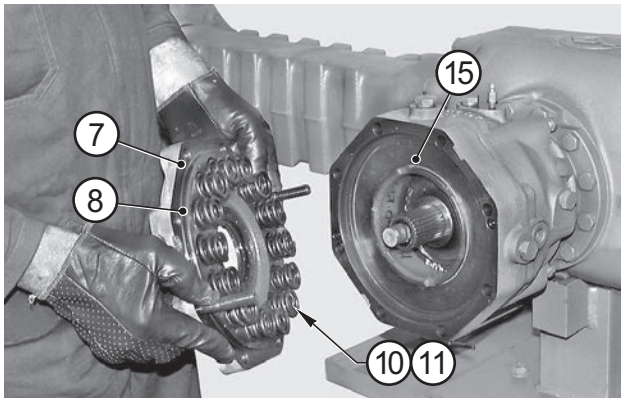


FIGURE 4: Remove the cover (7), complete with piston (15) reversal springs (10), (11), and o-ring (8).

NOTE:

Check the o-ring (8) and, if necessary, replace it.

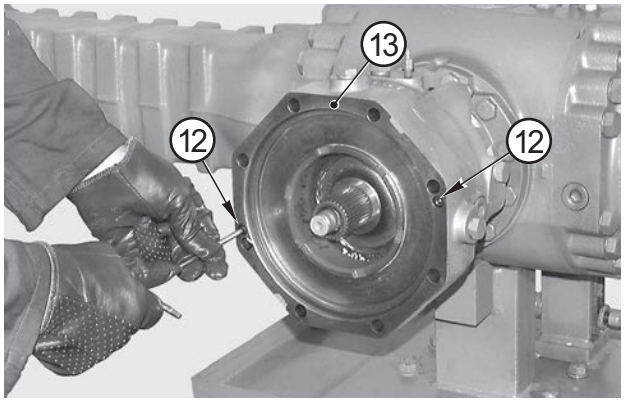


FIGURE 5: Loosen and remove the check screws (12) of cylinder (13).

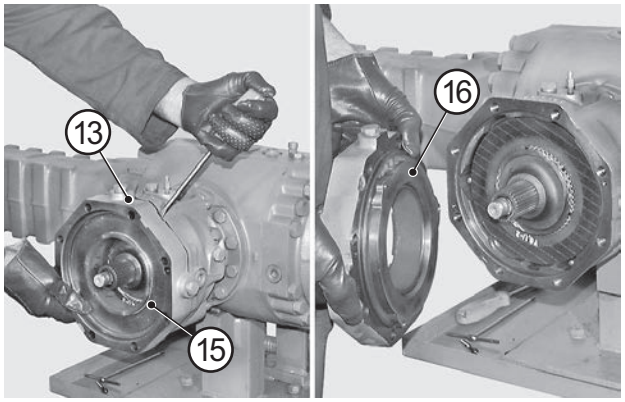


FIGURE 6: By prying with a lever, remove the cylinder (13) complete with: the piston (15) of the negative brake and the intermediate disc (16).

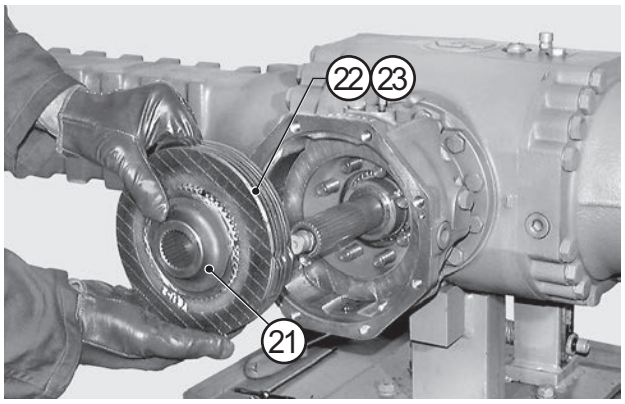


FIGURE 7: Remove the coupling (21) and the braking discs (22), (23).

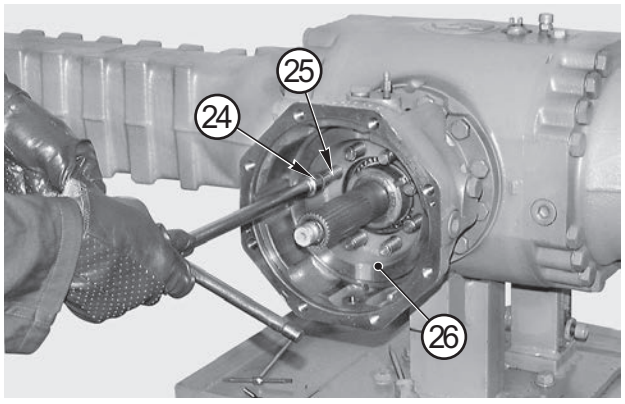


FIGURE 8: Loosen and remove the pin-type screws (24) and the piston (26) reversal springs (25).

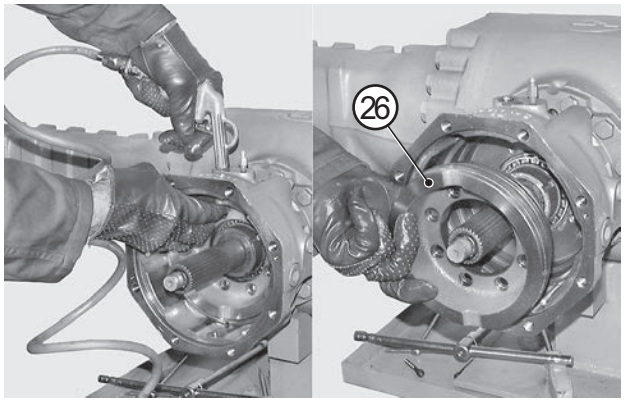


FIGURE 9: Gently introduce compressed air through the service brake connection point to extract the piston (26).

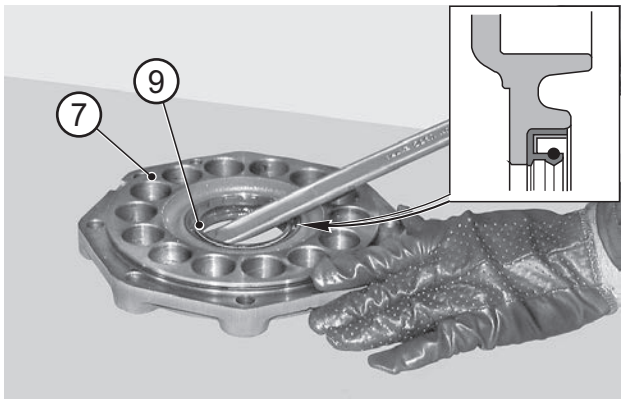


FIGURE 10: Remove the snap ring (9) from the cover (7).

NOTE:

Write down the direction of assembly and replace the ring (9) each time the unit is disassembled.

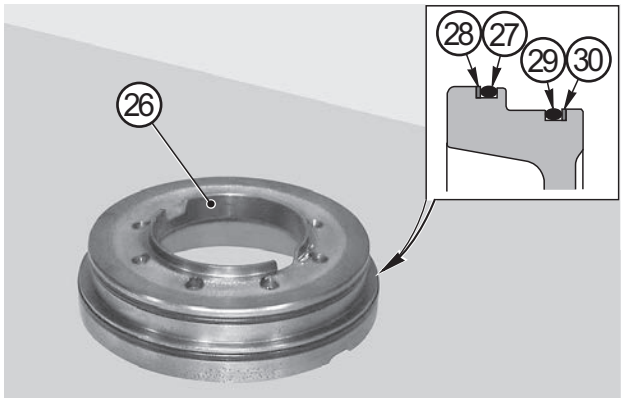


FIGURE 11: Remove o-rings (27), (29) and anti-extrusion rings (28), (30), from the piston (26) of the service brake.

NOTE:

The snap rings (17), (19) and anti-extrusion rings (28), (30) must be replaced each time the unit is disassembled.

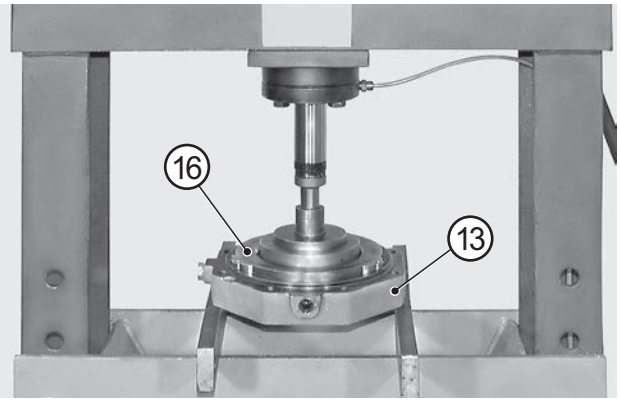


FIGURE 12: Place the negative brake cylinder unit (13) under a press and extract the intermediate disc (16) by applying pressure to the internal collar of the piston.

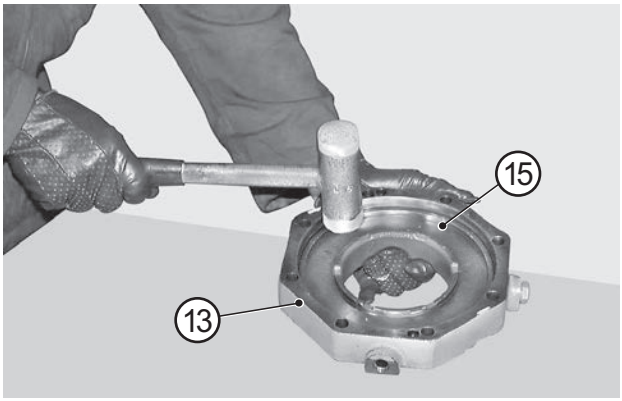


FIGURE 13: Using a plastic hammer, extract the piston (15) from the cylinder (13).

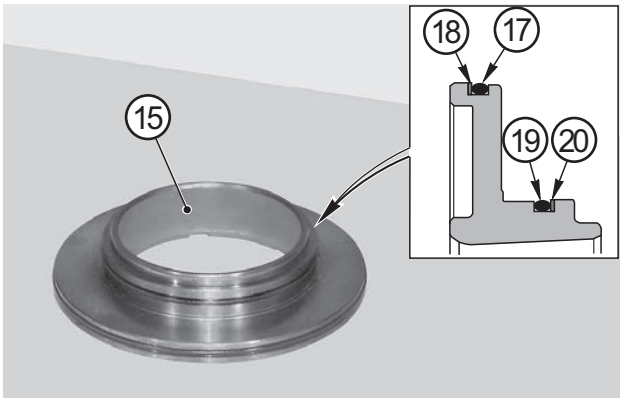


FIGURE 14: Remove o-rings (17), (19) and anti-extrusion rings (18), (20) from the piston (15).

NOTE:

The snap rings (17), (19) and anti-extrusion rings (18), (20), must be replaced each time the unit is disassembled.

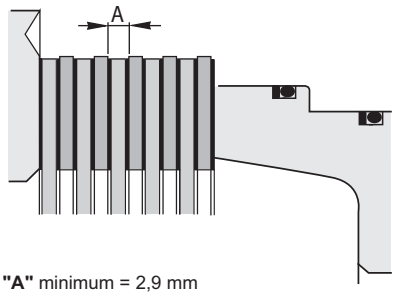


FIGURE 15: Whatever the reasons for disassembling the brake unit, always check the thickness of the braking discs (23). If shim "A" of just one disc (23) is close to the minimum admissible size of 2.9 mm, replace the entire pack.

ASSEMBLY

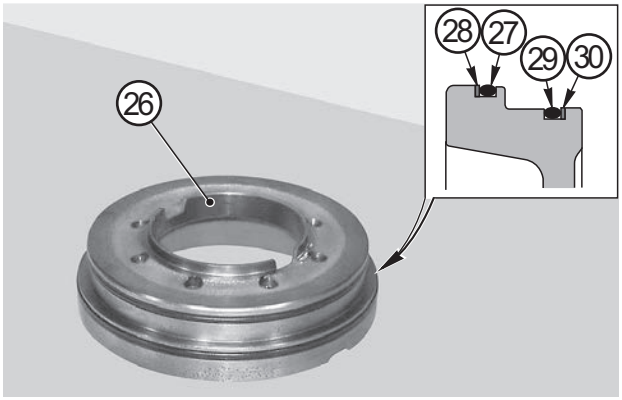


FIGURE 16: Fit the o-rings (27), (29) and the anti-extrusion rings (28), (30) onto the piston (26).

NOTE:

Carefully check the assembly position of rings (28), (30).

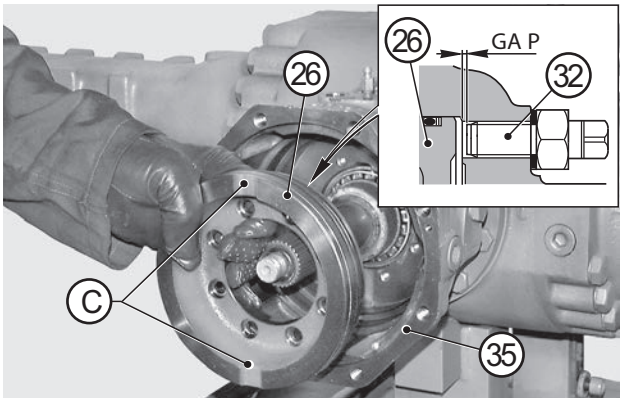


FIGURE 17: Lubricate the seals and fit the piston (26) into the braking unit (35).

NOTE:

1 - Keep the oil throughways "C" vertical.

2 - Ensure that the adjusting screws (32) are recessed in relation to the piston (26) touch down plane.

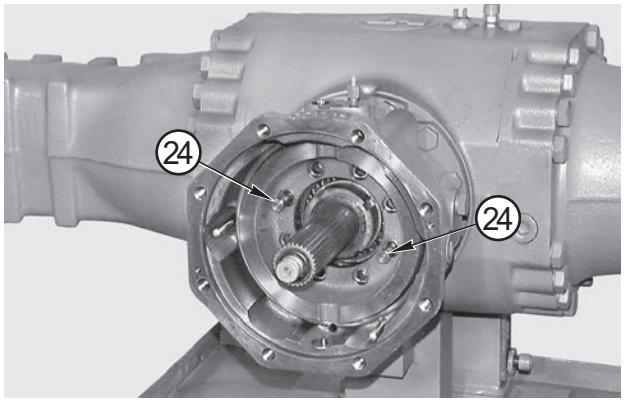


FIGURE 18: Insert two opposing screws (24) as guides

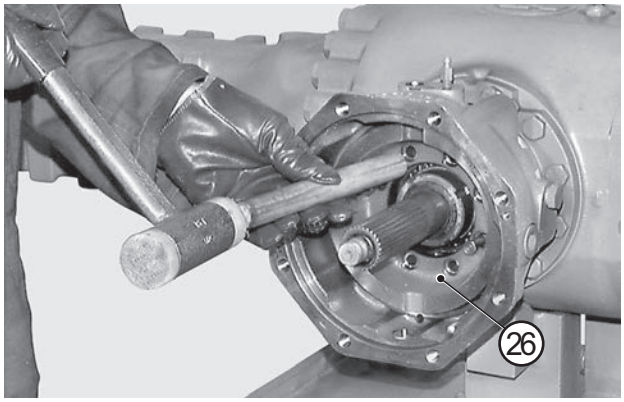


FIGURE 19: Using a bar, push the piston (26) to the end of its stroke.

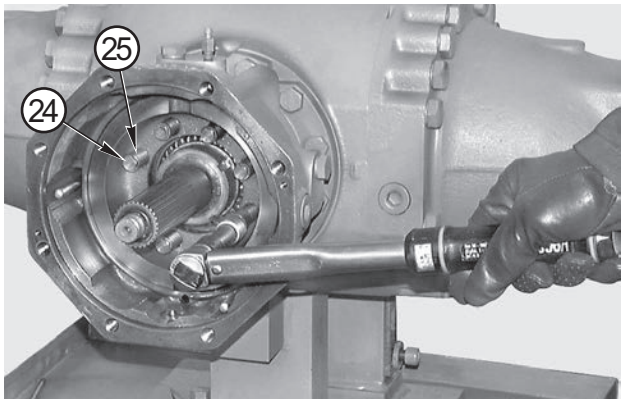


FIGURE 20: Remove the two screws (24) used as guides. Apply Loctite 242 to the thread of screws (24), fit the springs (25) and screw them in an alternate and criss-cross method. Tighten with a torque of 10 - 15 N·m

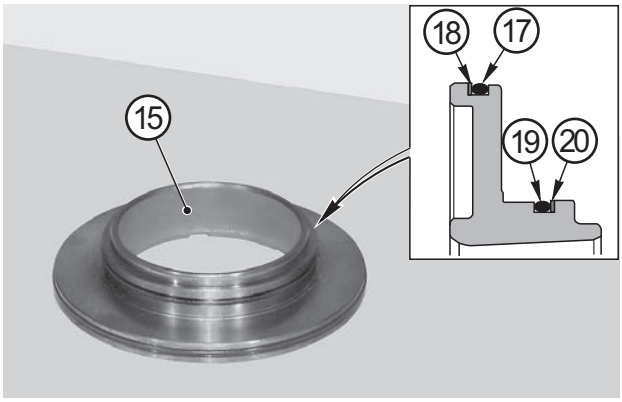


FIGURE 21: Fit the o-rings (17), (19) and the anti-extrusion rings (18), (20) on the piston (15).

NOTE:

Carefully check the assembly position of rings (18), (20).

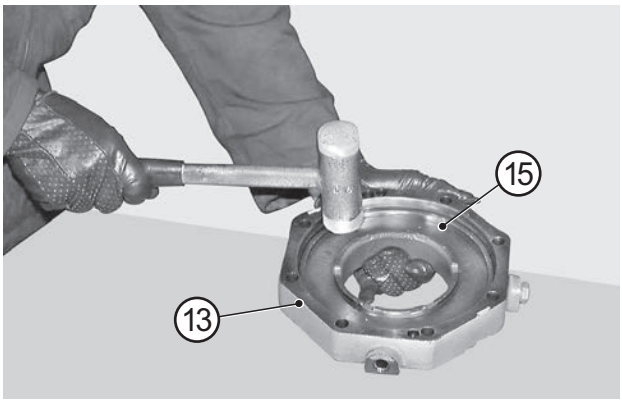


FIGURE 22: Lubricate the seals and fit the piston (15) in the cylinder (13). Push it to the end of its stroke with the help of a plastic hammer.

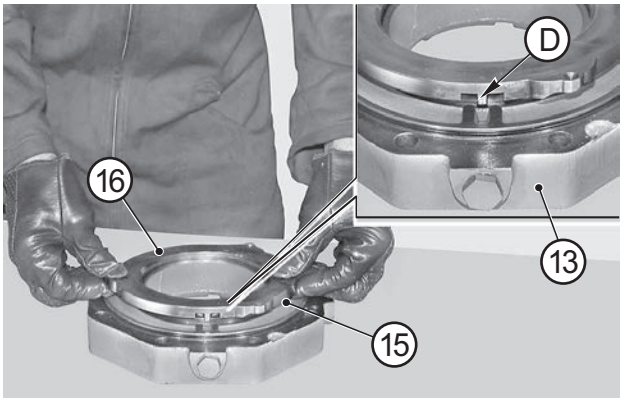


FIGURE 23: Heat the intermediate disc (16) at about 120° C and install it on the piston (15) by centering tooth "D" in the slot of the cylinder (13).

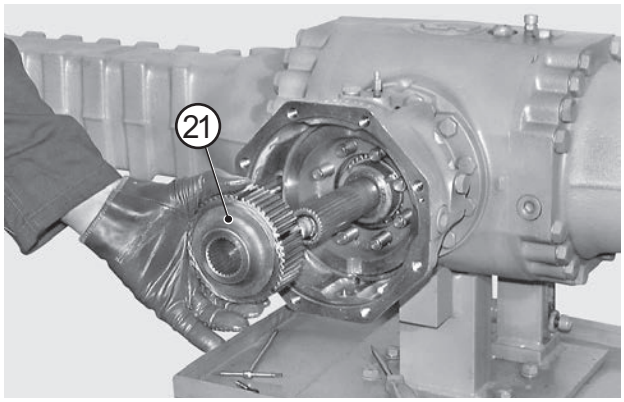


FIGURE 24: Fit the coupling (21) onto the pinion.

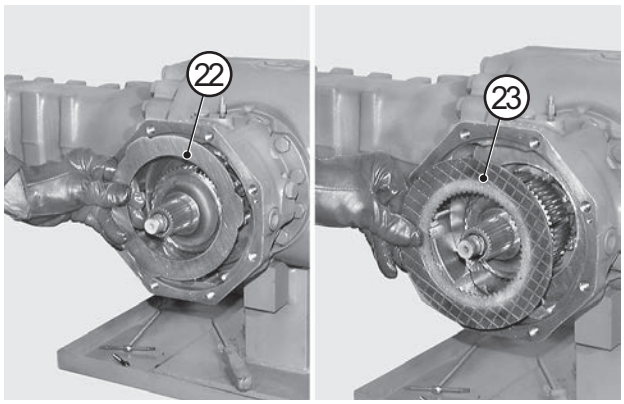


FIGURE 25: Install the braking discs (22), (23) on the coupling (21) by starting with a steel disc (22).

NOTE:

Before assembling, lubricate the friction discs (23) with oil.

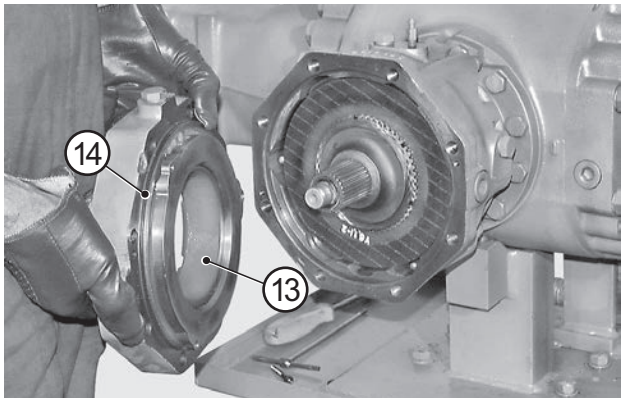


FIGURE 26: Lubricate the o-ring (14) and install the cylinder (13).

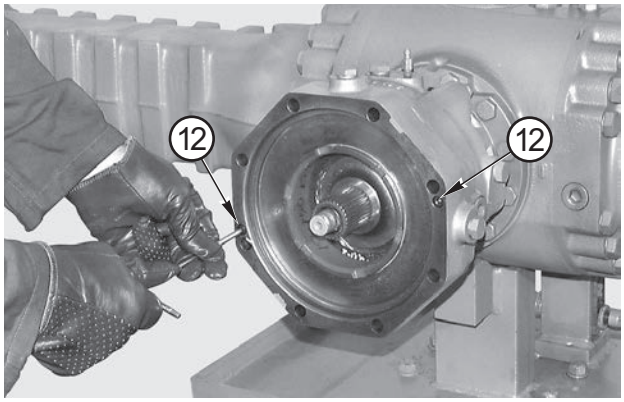


FIGURE 27: Fix the cylinder (13) with the screws (12), tightening to a torque of 9.5 - 10.5 N·m.

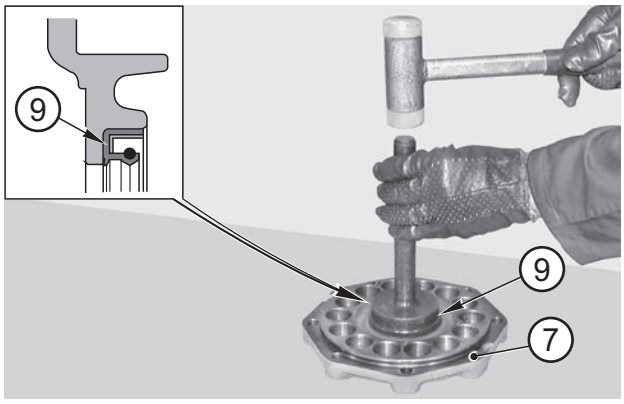


FIGURE 28: With the help of a punch, fit the snap ring (9) into the cover (7).

NOTE:

Carefully check the orientation of the snap ring (9).

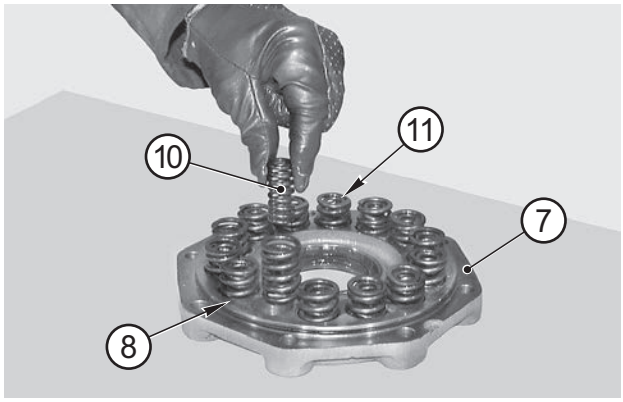


FIGURE 29: Fit the external (11) and internal (10) reversal springs of piston (15) into the seats of the cover (7).

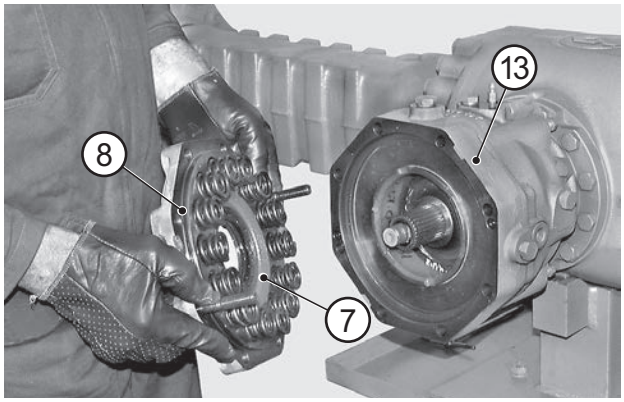


FIGURE 30: Lubricate the seal (8) and fit the cover unit (7) onto the cylinder (13), as well as the snap washers (6) and the screws (5).

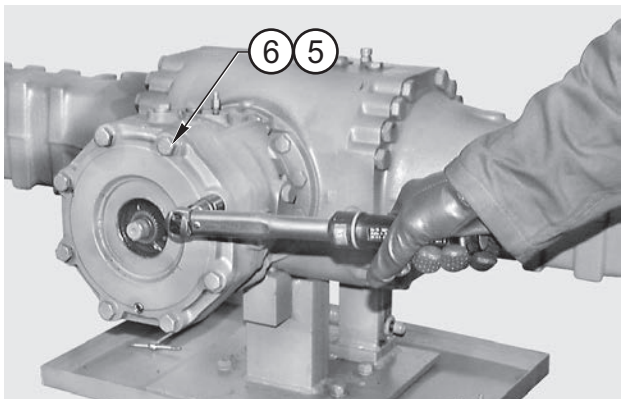


FIGURE 31: Lock the unit with a torque wrench set to 82 - 91 N·m.

⚠CAUTION

Tighten the gap by tightening the screws gradually and in a criss-cross method.

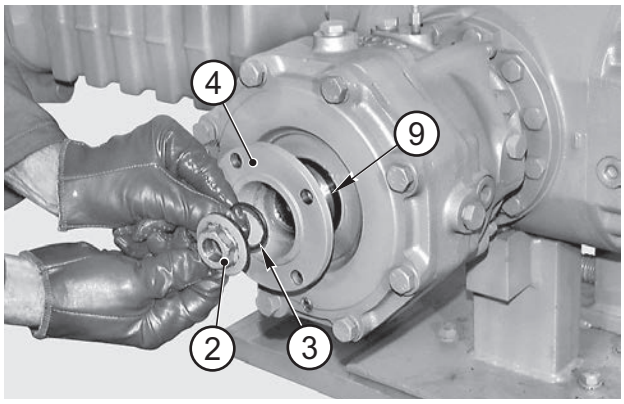


FIGURE 32: Lubricate the snap ring (9) and fit the flange (4) and the o-ring (3).
Apply Loctite 242 to the tang of the pinion and fit the nut (2).

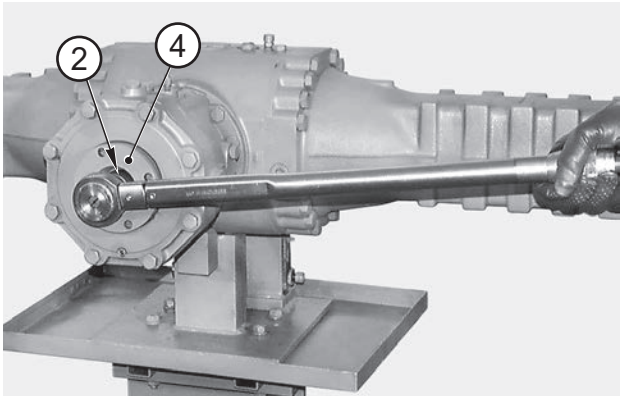


FIGURE 33: Tighten the check nut (2) of the flange (4) with a torque wrench set to 280 - 310 N·m.

NOTE:

Use tool T2 (See drawing T2 p. 119).

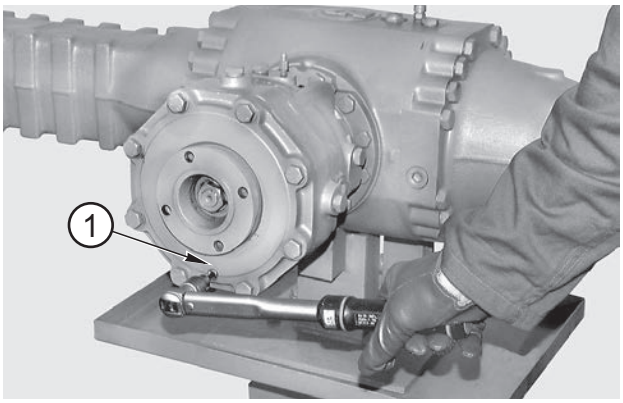


FIGURE 34: Fit the drain plug (1) and, with a torque wrench, tighten to a maximum torque of 15 N·m.

⚠CAUTION

Do not exceed the specified torque.

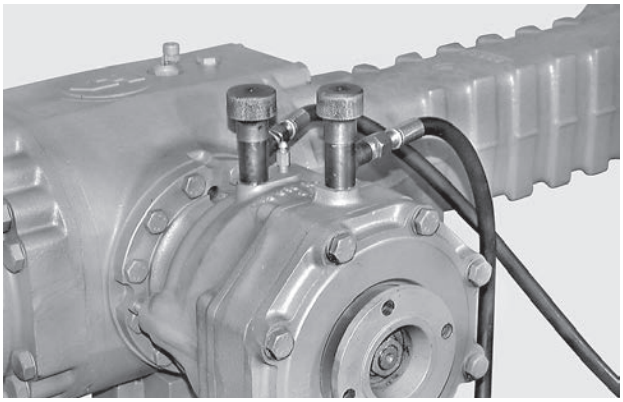


FIGURE 35: Connect the connection points of the service brake and negative brake to an external pump and introduce a pressure of 20 - 30 bar.

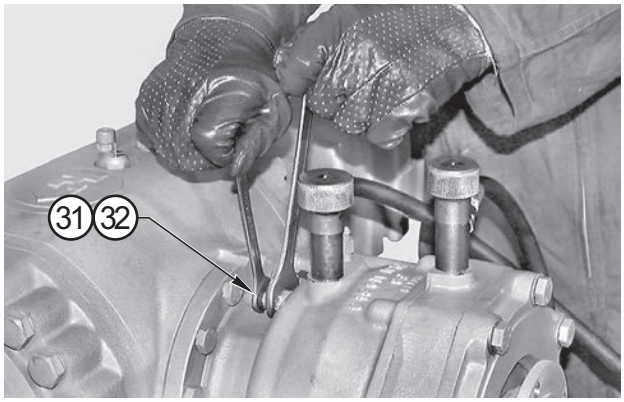


FIGURE 36: Adjust the service brake stroke by tightening the screws (32) up to a maximum torque of 10 N·m, until they are fixed to the piston (26).
Unscrew by 7 faces of the hexagon (equivalent to 2 mm) and secure with the nuts (31), tightening to a torque of 15 N·m.

RELEASE

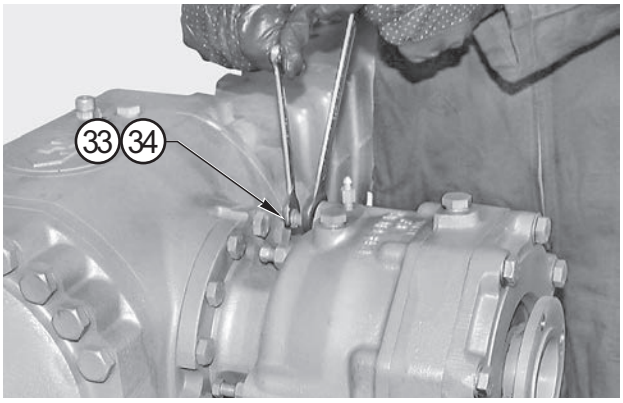


FIGURE 37: To release the negative brake in an emergency, loosen the 3 check nuts (33).
Tighten the screws (34) until they are fixed to the piston; tighten further, in a gradual and alternate manner, by a maximum of 1.5 turns.

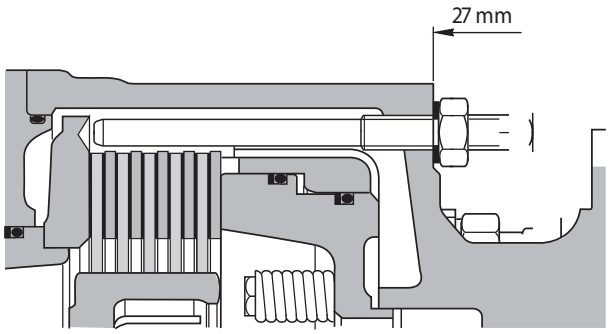
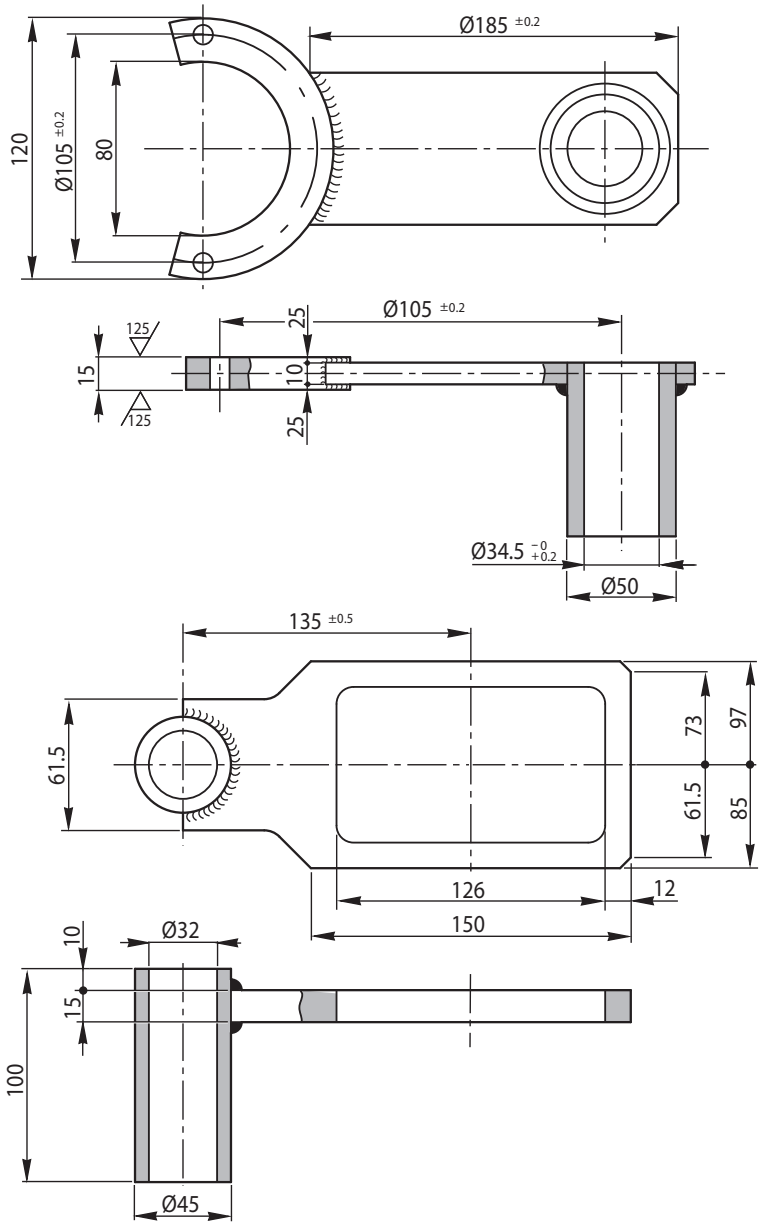


FIGURE 38: When emergency is over, loosen the screws (34) in a gradual and alternate manner until the value of 27 mm is restored.
Lock screws in position with the nuts (33) tightened to a torque of 15 N·m.

SPECIAL TOOLS

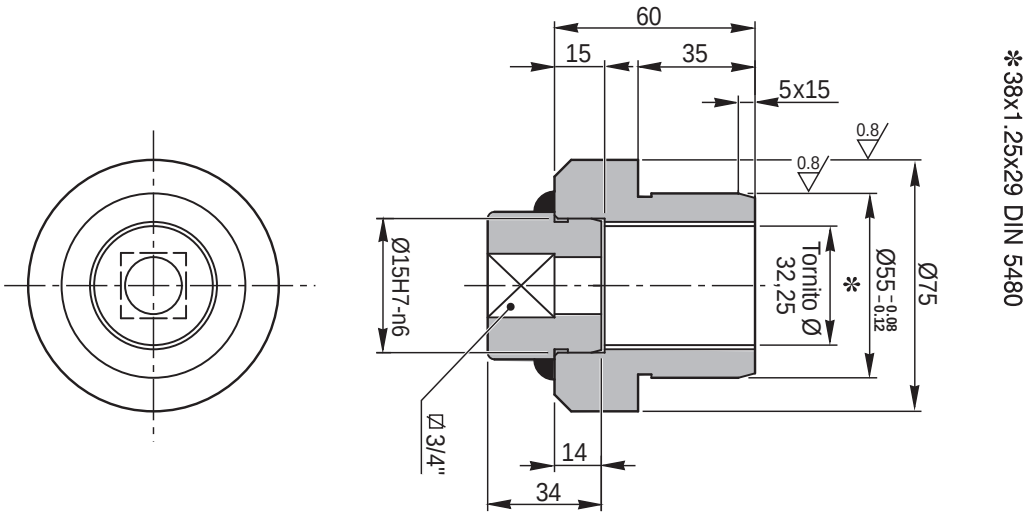
T1

P/N: 2308



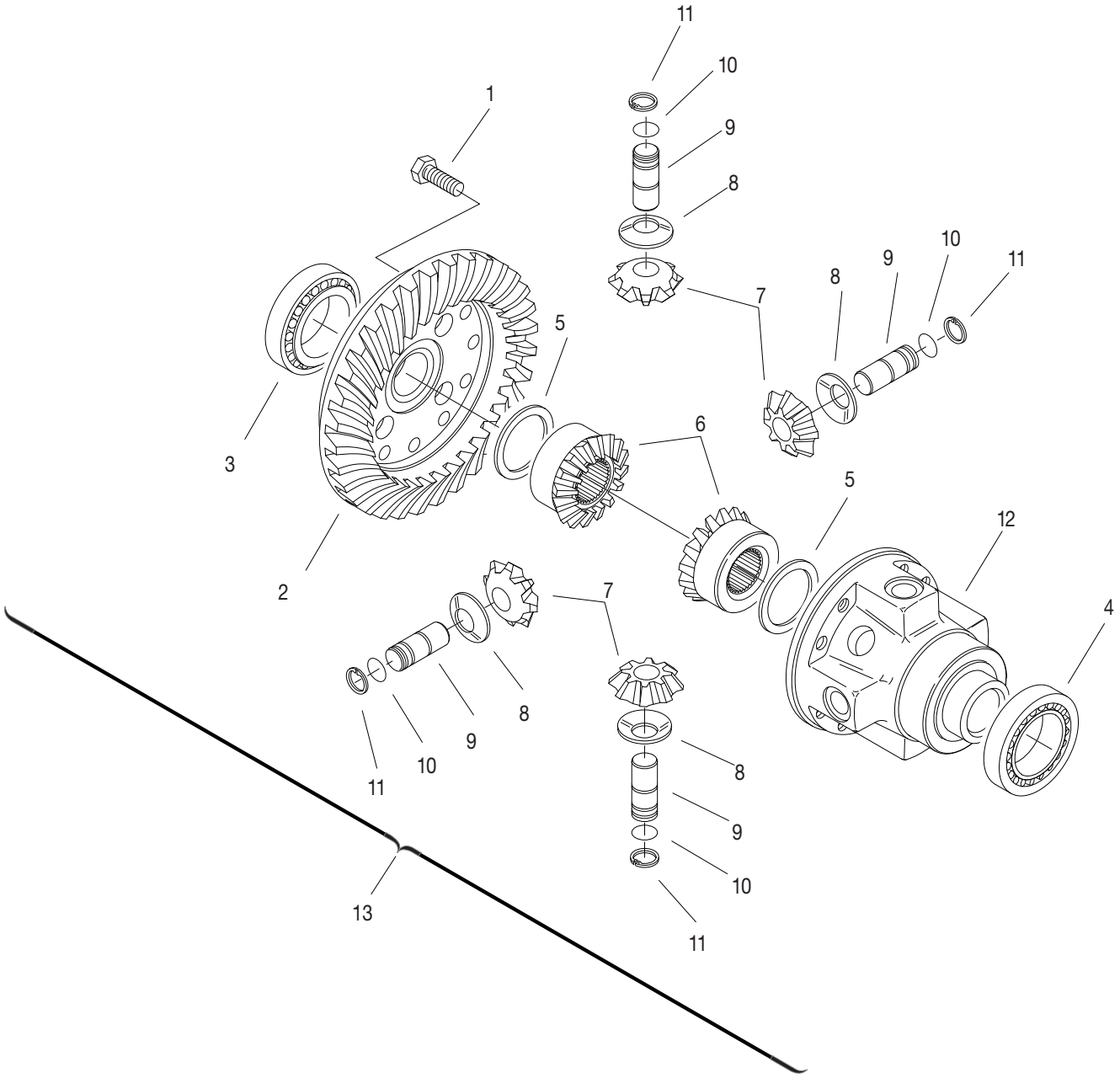
T2

P/N: 3317/3


60
15
35
5x15
0.8
0.8
Ø15H7-n6
Tornito Ø 32,25
*
Ø55 -0.08 -0.12
Ø75
Ø 3/4"
14
34
*38x1.25x29 DIN 5480

NORMAL DIFFERENTIAL UNIT

EXPLODED VIEW



DISASSEMBLY

⚠CAUTION

Before draining oil, release the internal pressure, for details see OIL DRAINING MANDATORY PROCEDURE p. 14.

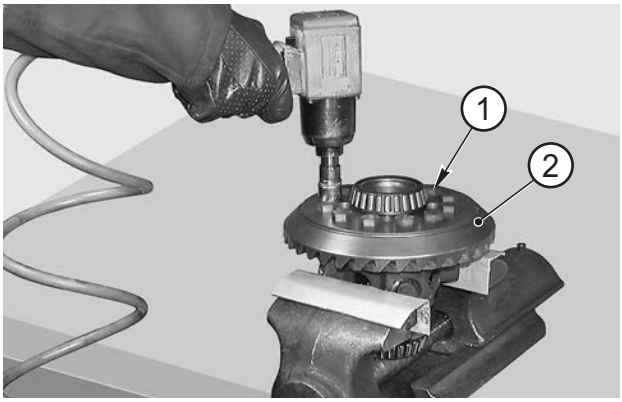


FIGURE 1: Remove the capscrews (1) from the crown (2).

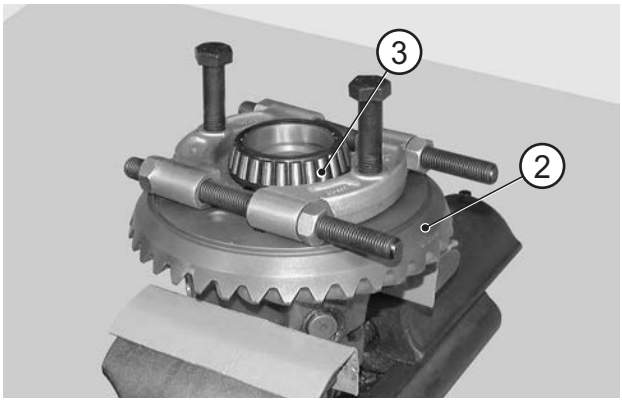


FIGURE 2: If the bearing needs replacing, extract the bearing (3) and remove the crown (2).

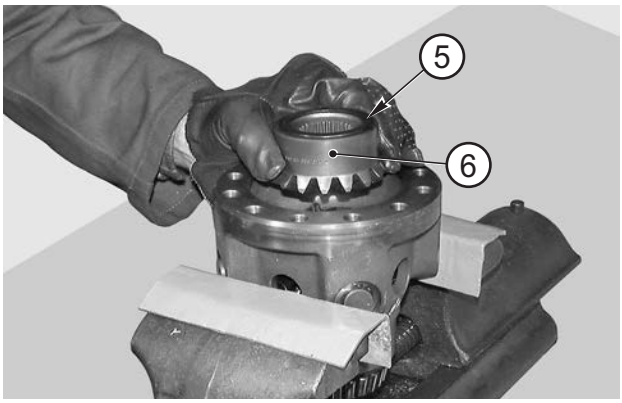


FIGURE 3: Remove the shim washer (5) and the planetary gear (6).

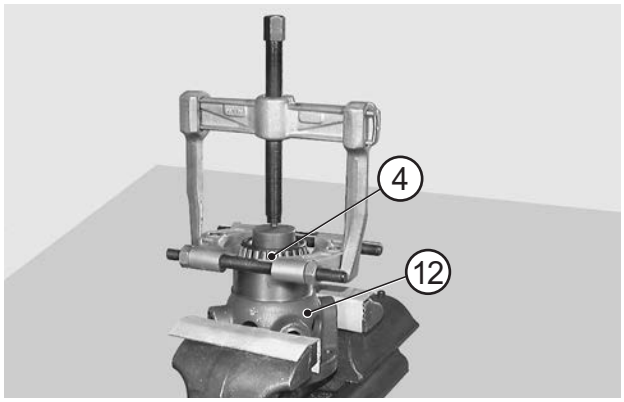


FIGURE 4: If the bearing need replacing, extract the bearing (4) from the differential carrier (12).

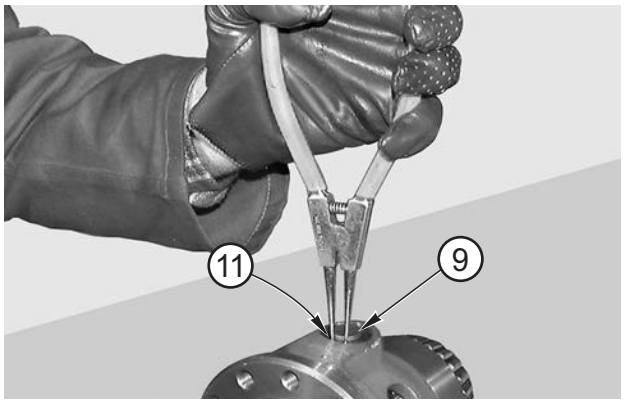


FIGURE 5: Remove the snap rings (11) from the two pins (9) of the planetary gears (7).

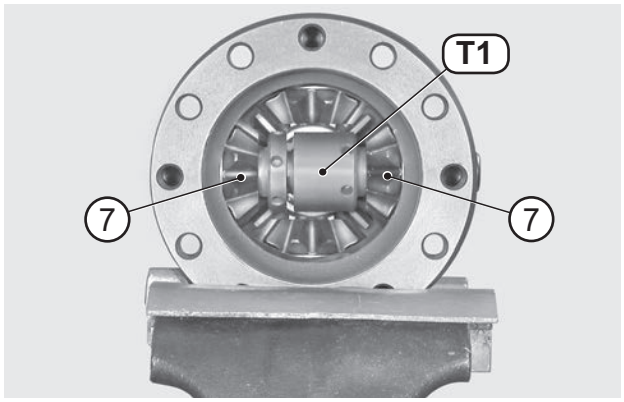


FIGURE 6: Insert tool T1 (See drawing T1 p. 128) between the planetary gears (7).

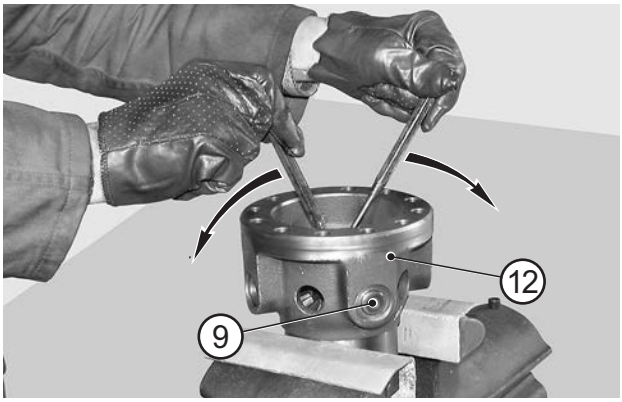


FIGURE 7: Force tool T1 (See drawing T1 p. 128) in-between the planetary gears (7) using two pin-drivers.

⚠CAUTION

Make sure that tool T1 (See drawing T1 p. 128) is perfectly lined up with the pins (9) when locked.

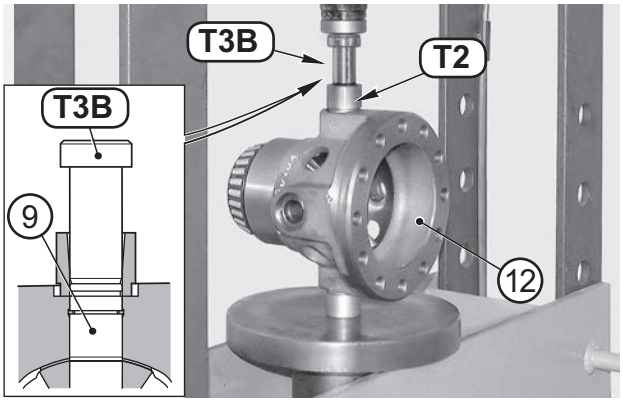


FIGURE 8: Place the differential carrier (12) under a press, position guide bushing T2 (See drawing T2 p. 129) and insert press tool T3A (See drawing T3 p. 129). Press T3A (See drawing T3 p. 129) pin to limit position.

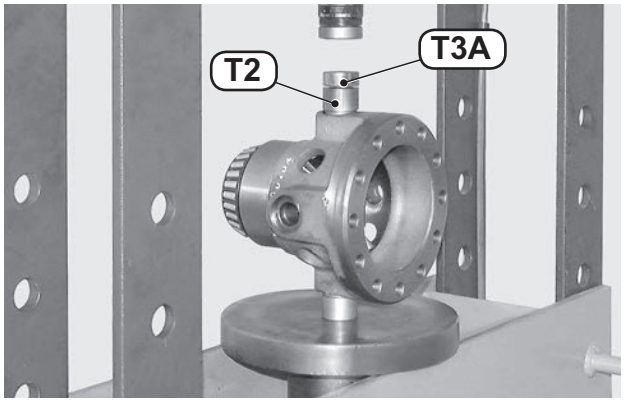


FIGURE 9: Remove press tool T3A (See drawing T3 p. 129) and guide bushing T2 (See drawing T2 p. 129).

NOTE:

In this condition the tool T1 (See drawing T1 p. 128) contains pin (9).

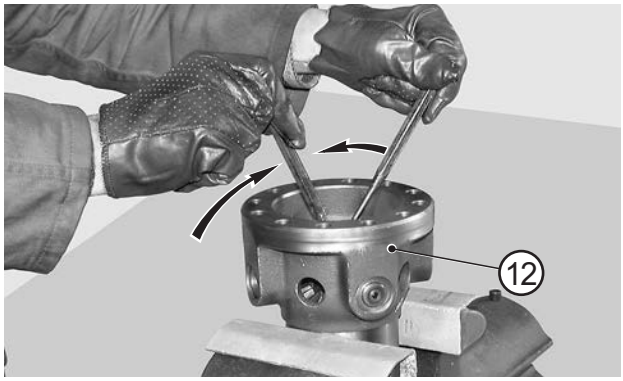


FIGURE 10: Remove tool T1 (See drawing T1 p. 128) together with the pin (9) of the planetary gear.

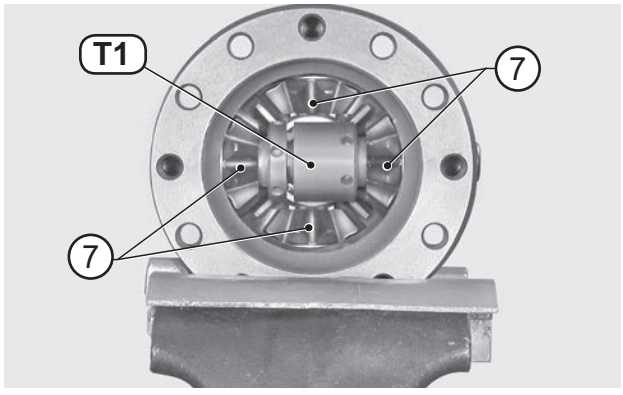


FIGURE 11: Leave the released planetary gear in position and again lock tool T1 (See drawing T1 p. 128).
Repeat the operations for the extraction of the pin of the 2nd planetary gear (9).
Repeat the operations for all other pins.

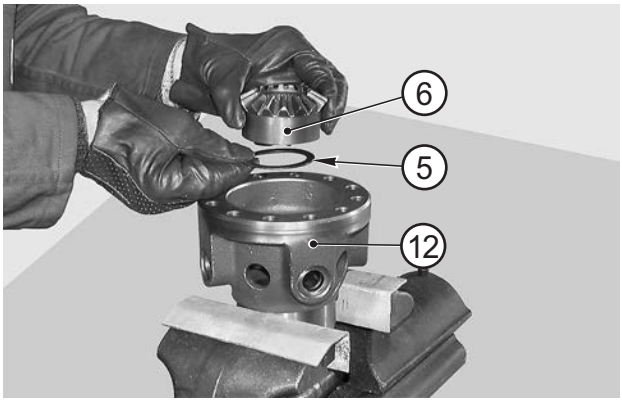


FIGURE 12: Remove tool T1 (See drawing T1 p. 128) and remove the last two planetary gears (7), the 2nd differential side gear (6) and the relative shim washer (5) from the differential carrier.

ASSEMBLY

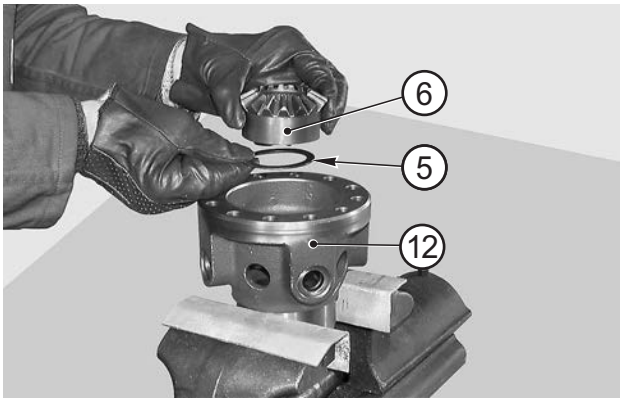


FIGURE 13: Insert the shim washer (5) and the differential side gear (6) in the differential carrier (12).

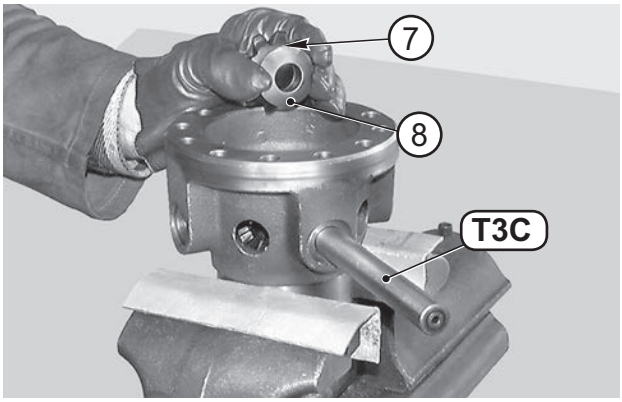


FIGURE 14: Position the shim washer (8) and the first planetary gear (7).
Hold them in position using bar T3C (See drawing T3 p. 129).

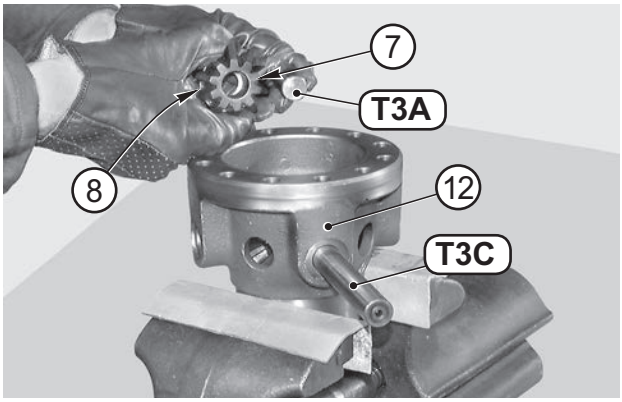


FIGURE 15: With the help of press tool T3A (See drawing T3 p. 129), position the second planetary gear (7) and the relative shim washer (8).

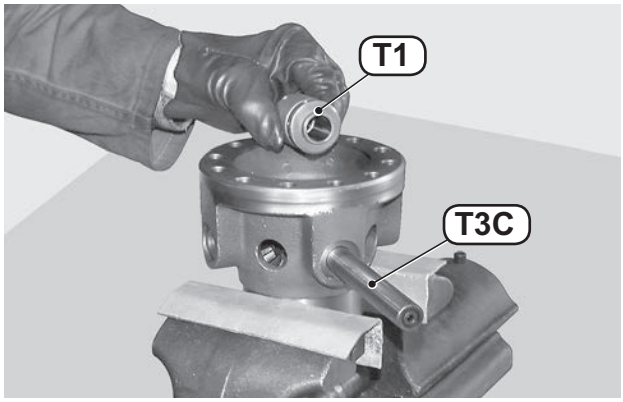


FIGURE 16: Insert tool T1 (See drawing T1 p. 128) between the two planetary gears (7). Line up the entire unit by pushing bar T3C (See drawing T3 p. 129) all the way down until press tool T3A (See drawing T3 p. 129) is ejected.

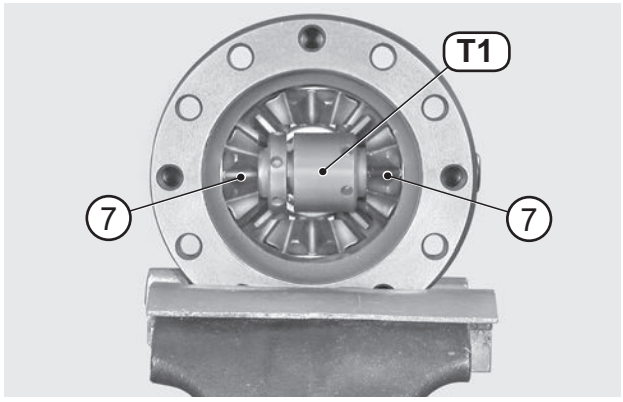


FIGURE 17: Lock tool T1 (See drawing T1 p. 128) behind the planetary gears (7).
After locking, remove bar T3C (See drawing T3 p. 129).

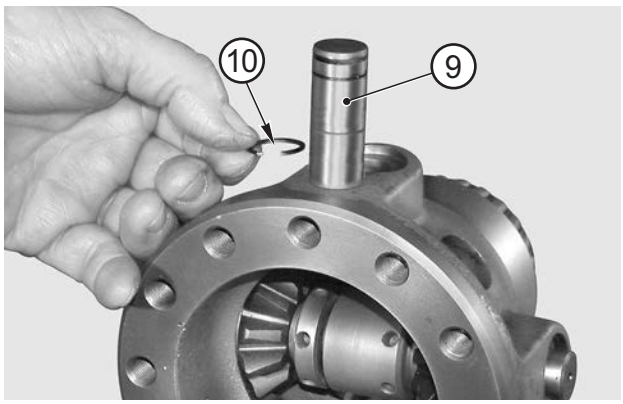


FIGURE 18: Fit the snap rings (11) onto the pins (9).

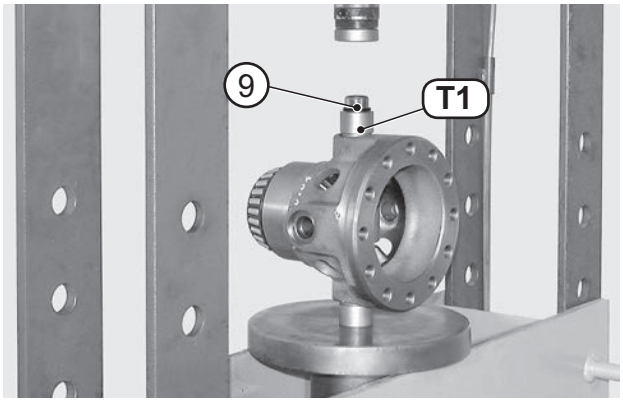


FIGURE 19: Place the differential carrier (12) under the press, position guide bushing T2 (See drawing T2 p. 129) and insert the planetary pin (9).

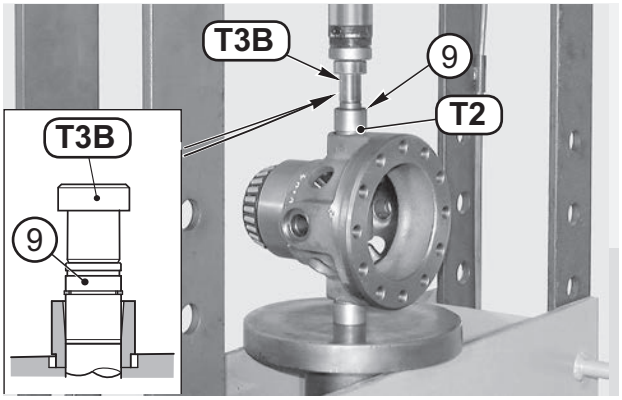


FIGURE 20: Put press tool T3B (See drawing T3 p. 129) on top of the planetary wheel pin (9).

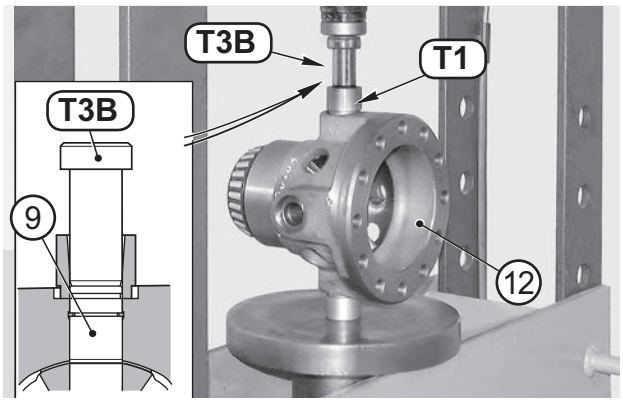


FIGURE 21: Press T3B (See drawing T3 p. 129) pin all the way down.

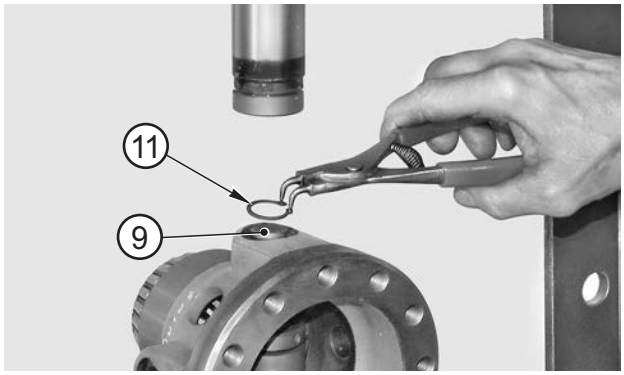


FIGURE 22: Remove press tool T3B (See drawing T3 p. 129), bushing T2 (See drawing T2 p. 129) and fit the snap ring (11) on the pin (9).

⚠CAUTION

Make sure that the snap ring centers the seat and that it rests on the surface of the differential carrier.

Repeat the operations on the other planetary pins.

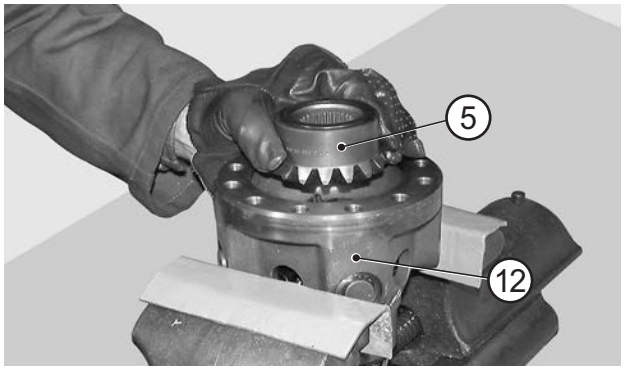


FIGURE 23: Position the second planetary gear (6) in the differential carrier (12).

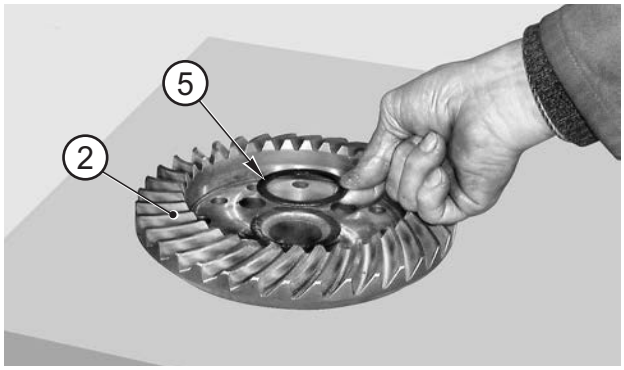


FIGURE 24: Position the shim washer (5) on the crown (2).

NOTE:

In order to hold the shim washer (5) in position, apply grease to it.

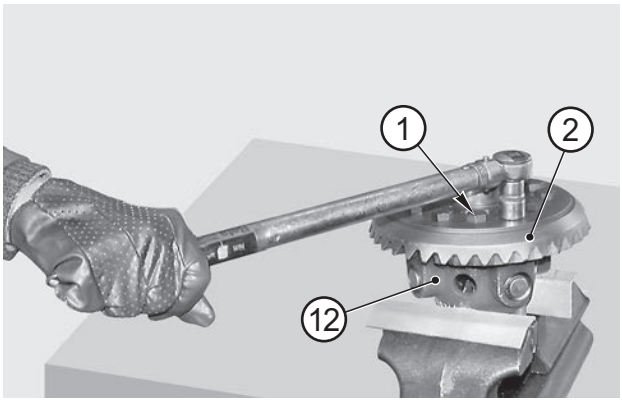


FIGURE 25: Position the crown (2) on the differential carrier (12) and lock it with screws (1) applied with Loctite 242. Torque wrench setting for screws: 128 - 142 N·m

NOTE:

Secure the screws using the criss-cross method.

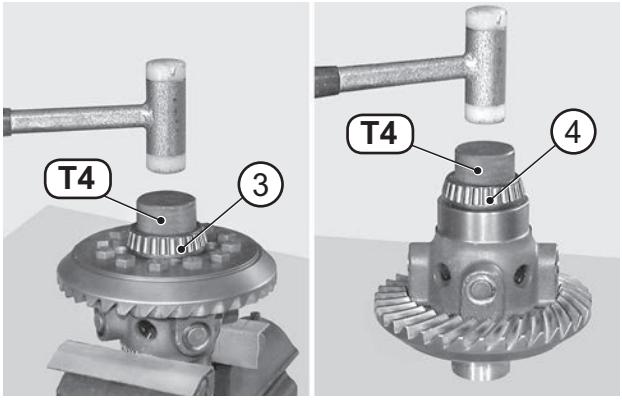
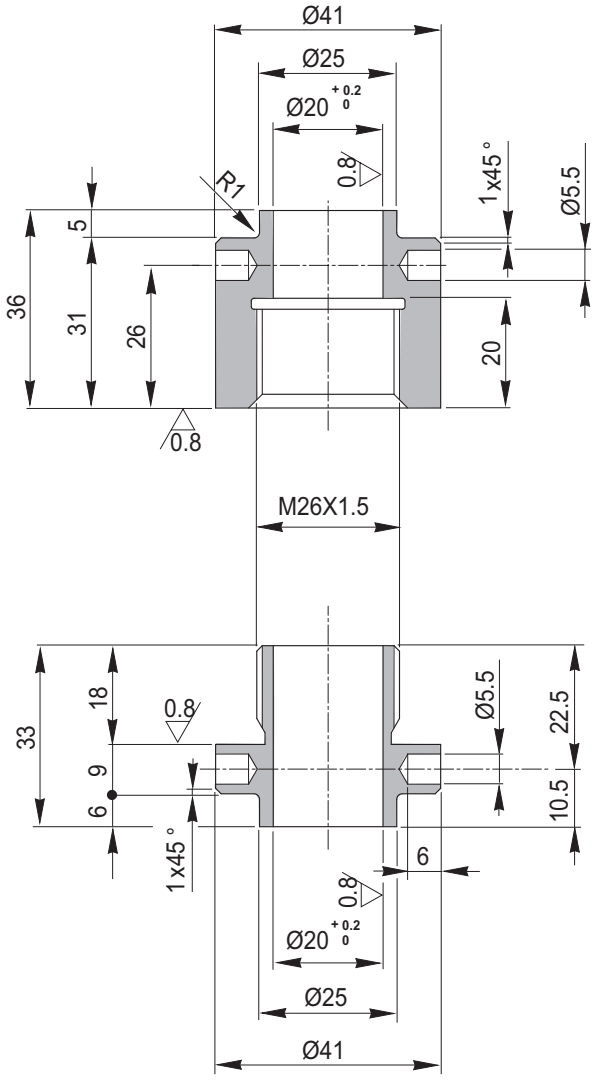


FIGURE 26: Install the bearings (3) and (4) using tool T4 (See drawing T4 p. 130).

SPECIAL TOOLS

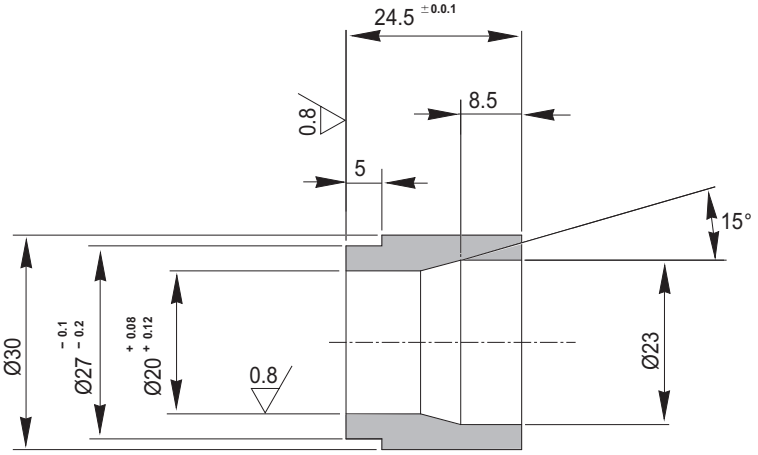
T1

P/N: 3708



T2

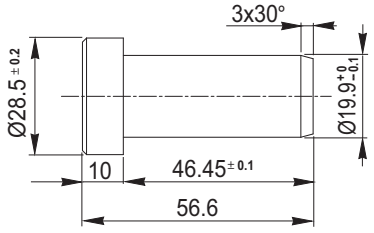
P/N: 3424



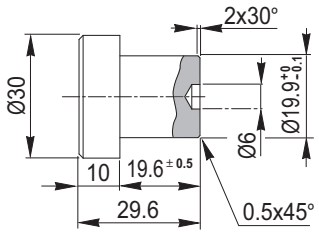
T3

P/N: 2306

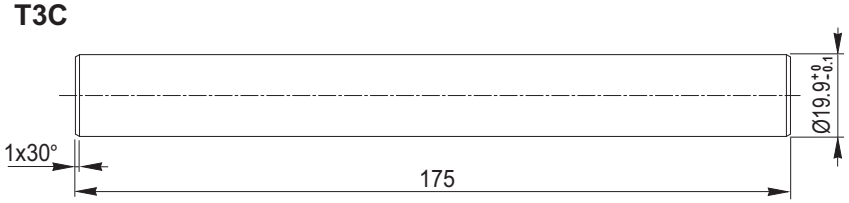
T3A



T3B

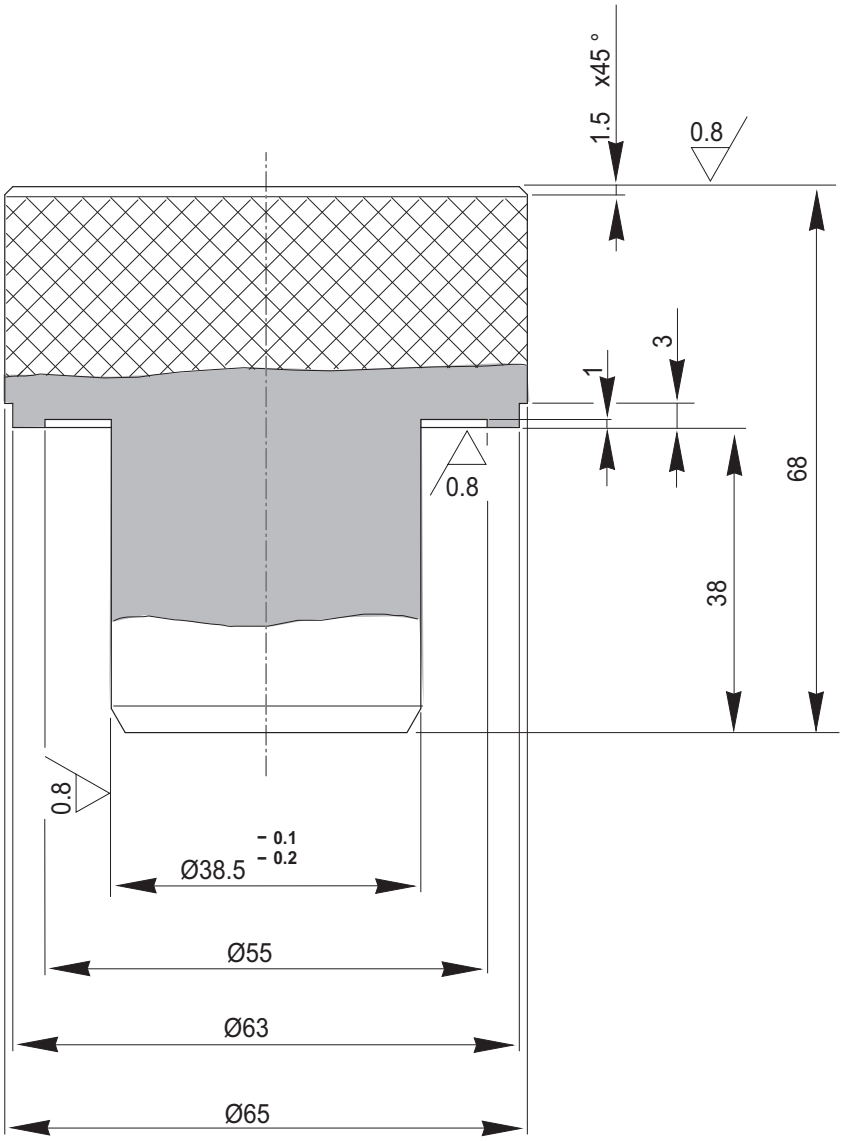


T3C



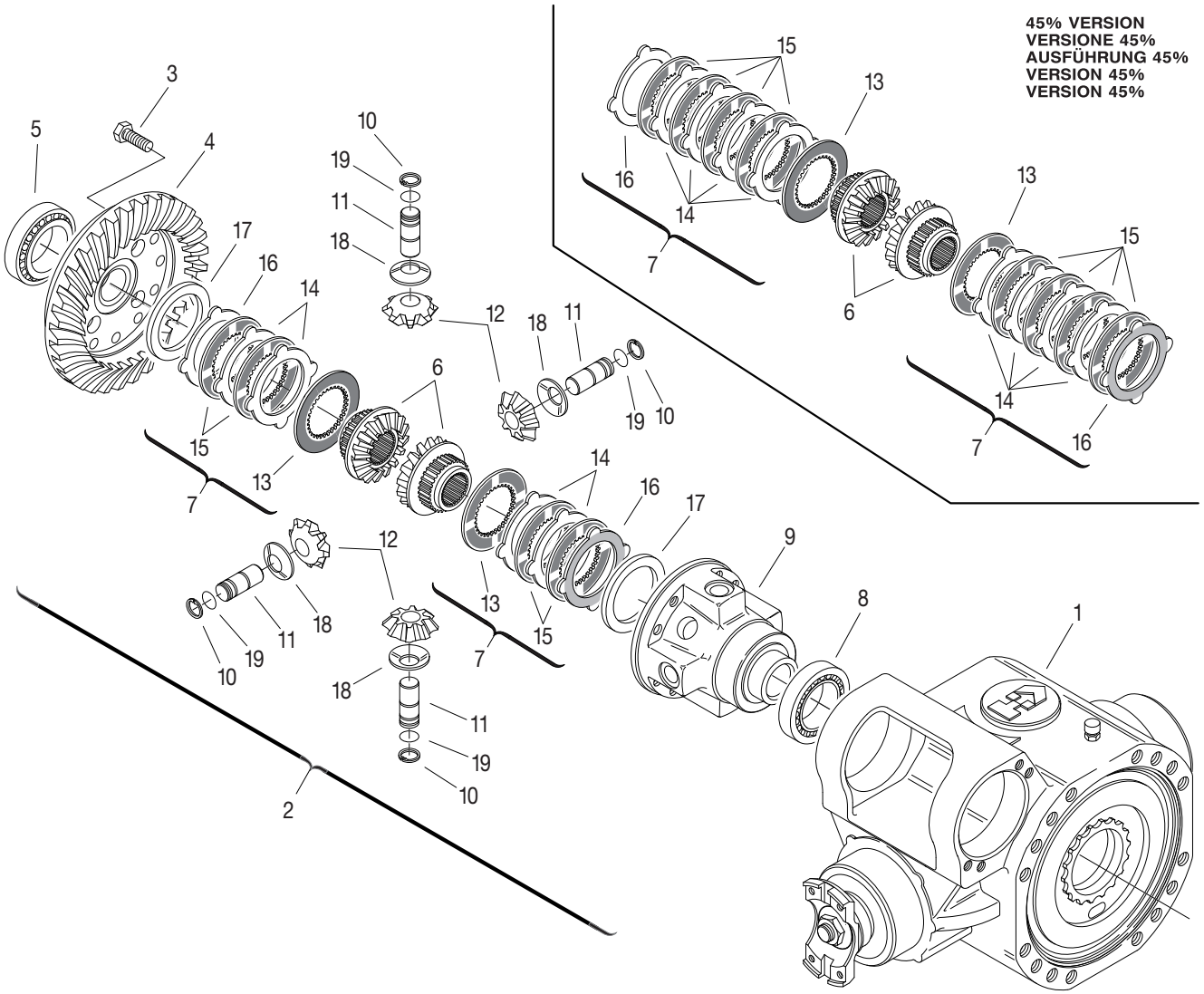
T4

P/N: 3332



LIMITED SLIP DIFFERENTIAL UNIT (25% AND 45%)

EXPLODED VIEW



DISASSEMBLY

⚠CAUTION

Before draining oil, release the internal pressure, for details see OIL DRAINING MANDATORY PROCEDURE p. 14.

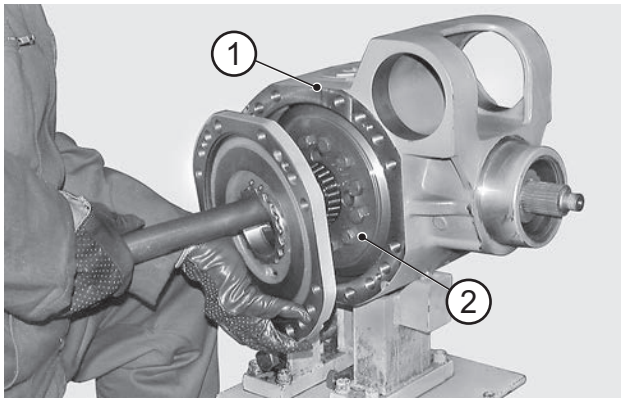


FIGURE 1: Remove the whole differential unit (2) from the central axle unit (1).
For details, see DIFFERENTIAL UNIT p. 55.

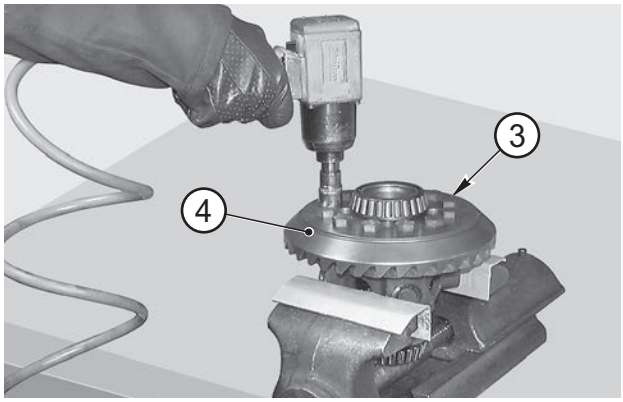


FIGURE 2: Remove the check screws (3) of the crown (4).

NOTE:

Write down the position of the niches of the central hole in relation to the protrusions of the friction unit steel discs.

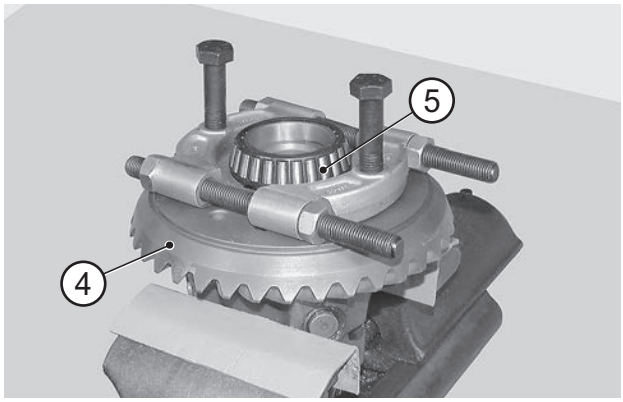


FIGURE 3: If bearing (5) needs replacing, remove it; remove crown (4).

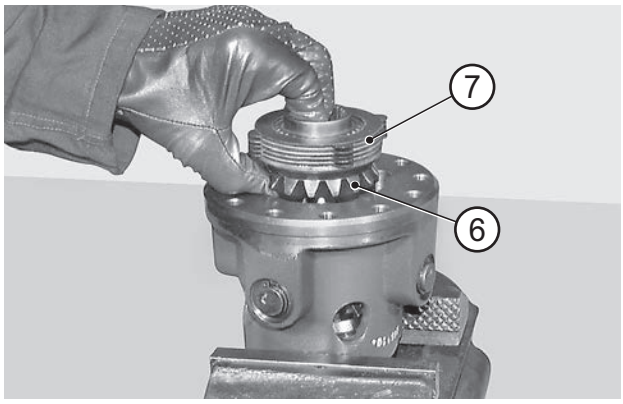


FIGURE 4: Remove the planetary gear (6) and the whole friction unit (7).

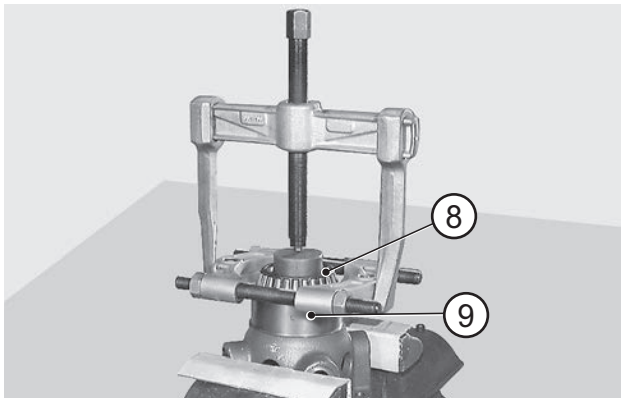


FIGURE 5: If bearing (8) needs replacing, extract it from the differential unit (9).

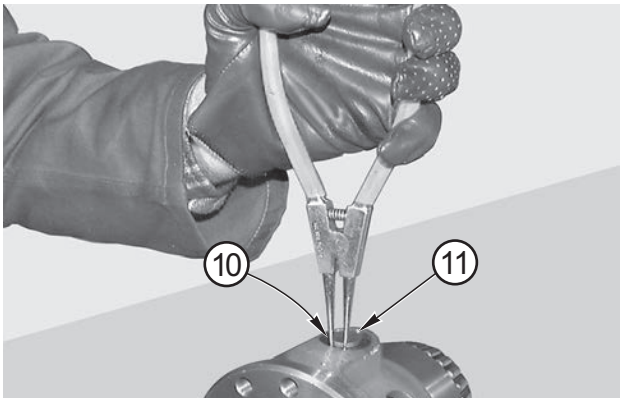


FIGURE 6: Remove the snap rings (10) from the pins (11) of the planetary gears (12).

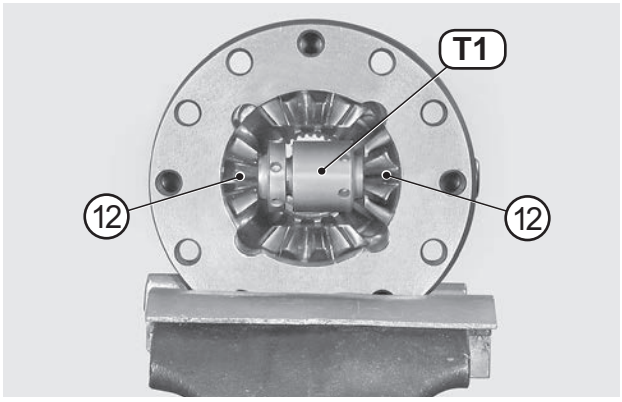


FIGURE 7: Introduce tool T1 (See drawing T1 p. 138) in-between the planetary gears (12).

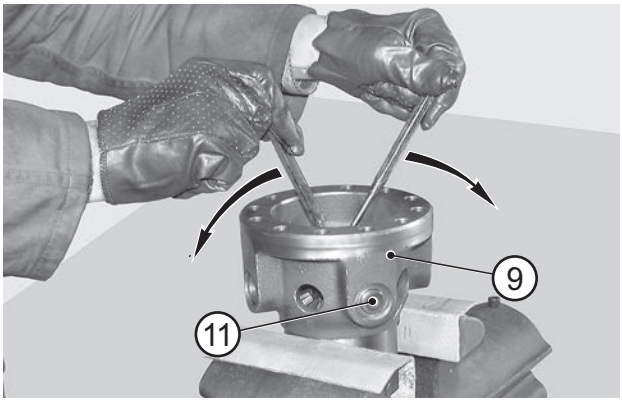


FIGURE 8: Using two pin-drivers, engage tool T1 (See drawing T1 p. 138) in between the planetary gears (12).

⚠CAUTION

Carefully check that tool T1 (See drawing T1 p. 138) keeps in an aligned position with the pins (11) when locked.

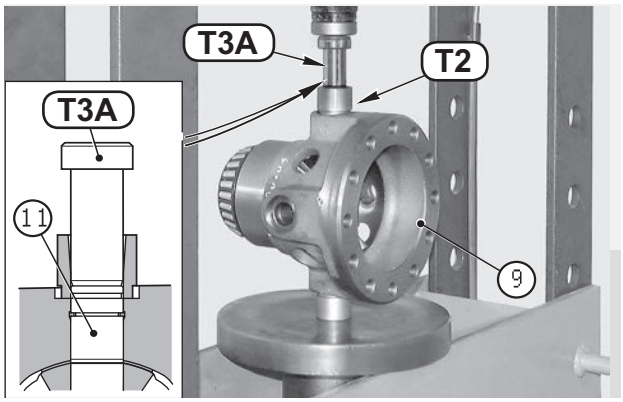


FIGURE 9: Place the differential unit (9) under a press, position guide bushing T2 (See drawing T2 p. 139) and insert press tool T3A (See drawing T3 p. 139). Press press tool T3A (See drawing T3 p. 139) to end of stroke.

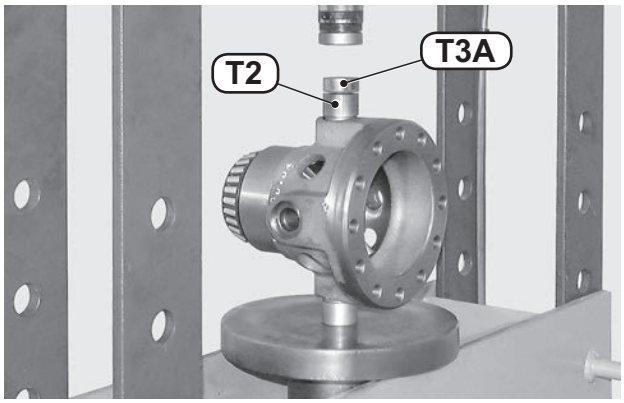


FIGURE 10: Remove press tool T3A (See drawing T3 p. 139) and bushing T2 (See drawing T2 p. 139).

NOTE:

In this state, the pin (11) is contained within tool T1 (See drawing T1 p. 138).

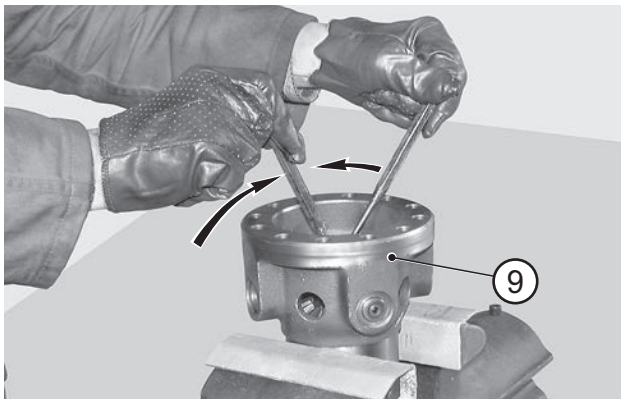


FIGURE 11: Remove tool T1 (See drawing T1 p. 138) and planetary pin (11) with it.

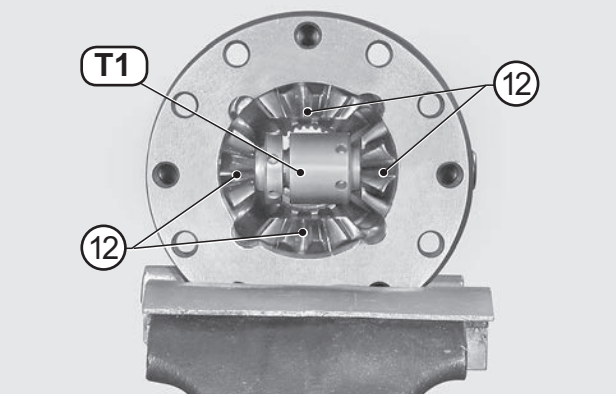


FIGURE 12: Leaving the released planetary in its position, lock again tool T1 (See drawing T1 p. 138).
Repeat pin extraction operation on the second planetary pin (11).
Repeat the same operations on the remaining pins.

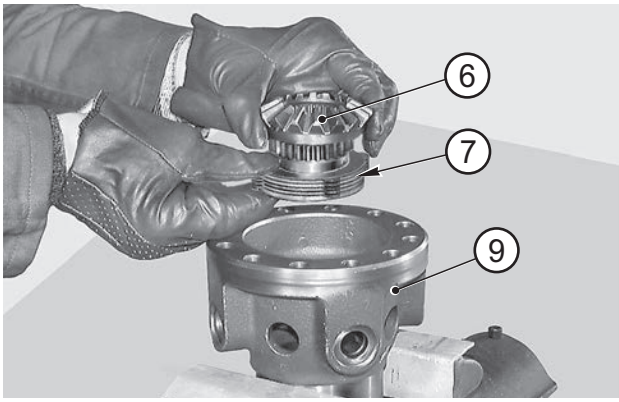


FIGURE 13: Remove tool T1 (See drawing T1 p. 138) and extract from the differential unit (9) the two final planetary gears (12), the 2nd differential side gear (6) and the whole friction assembly concerned (7).

ASSEMBLY

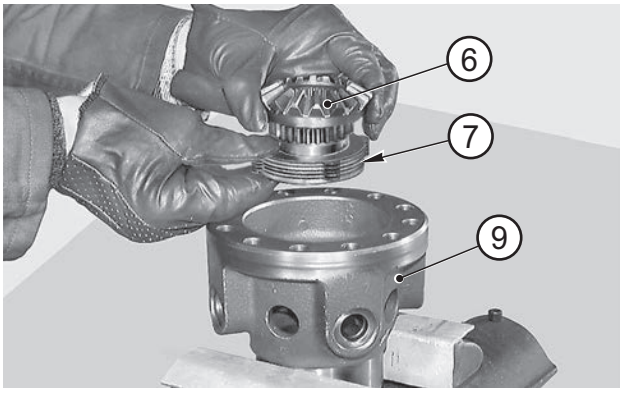


FIGURE 14: Place the friction disc assembly (7) - suitable for the specific type of slipping and differential side gear (6) into the differential unit (9).
The composition of the unit is illustrated in the points below.

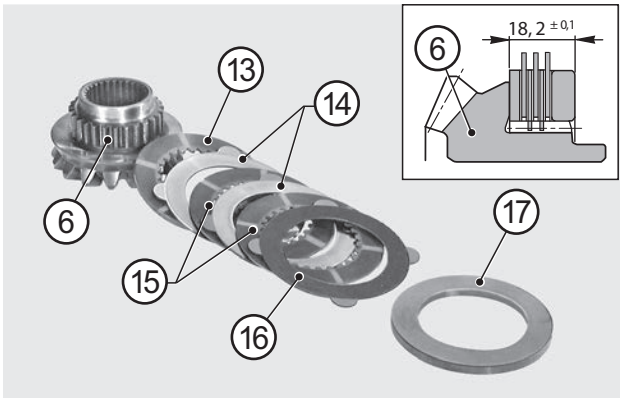


FIGURE 15: 25% FRICTION UNIT COMPOSITION
Friction ring with inner disc (13), intermediate discs (14) and friction discs (15) alternated, outer disc (16) and spacer (17).

⚠CAUTION

As to rings (13) and (16), the side without notches must face outwards.

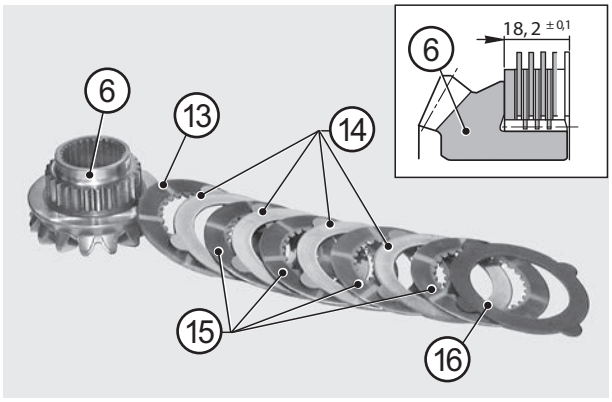


FIGURE 16: 45% FRICTION UNIT COMPOSITION
Friction ring with inner disc (13), intermediate discs (14) and friction discs (15) alternated, outer disc (16) and spacer (17).

⚠CAUTION

As to rings (13) and (16), the side without notches must face outwards.

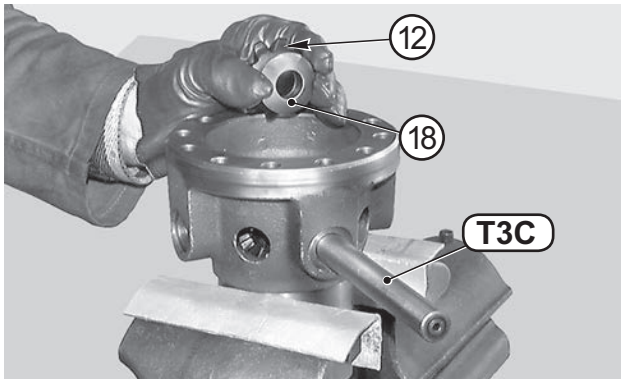


FIGURE 17: Position shim washer (18) and the first planetary gear (12).
Hold in position with bar T3C (See drawing T3 p. 139).

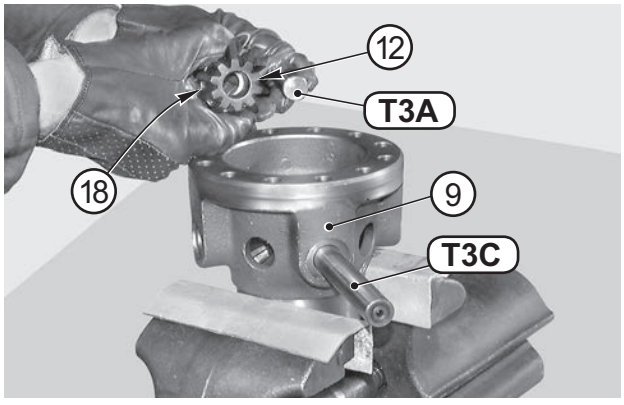


FIGURE 18: Using press tool T3A (See drawing T3 p. 139), position the second planetary gear (12) and relative shim washer (18).

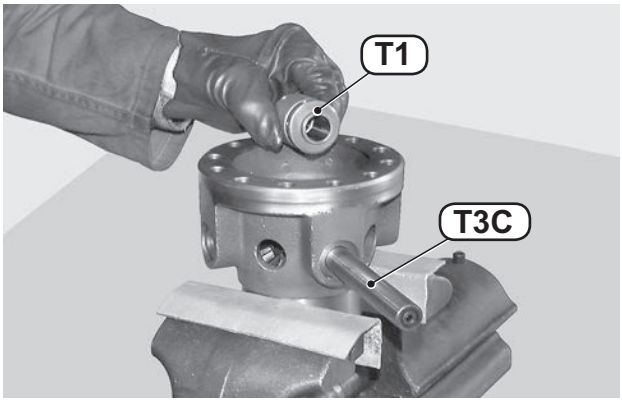


FIGURE 19: Insert tool T1 (See drawing) in-between the two planetary gears (12).
Align the whole unit, pushing bar T3C (See drawing T3 p. 139) in as far as it will go, until press tool T3A (See drawing T3 p. 139) is expelled.

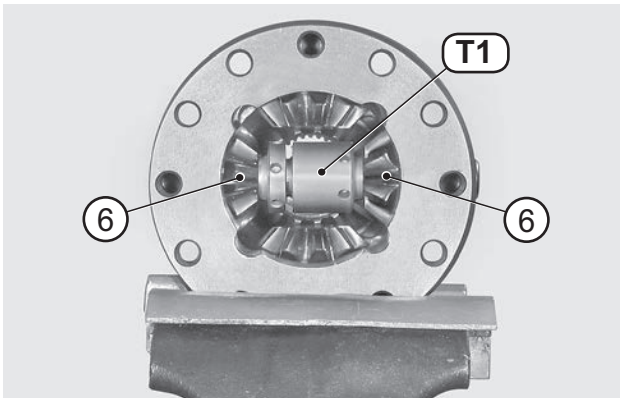


FIGURE 20: Lock tool T1 (See drawing T1 p. 138) behind the planetary gears (12).
After locking the tool, remove bar T3C (See drawing T3 p. 139).

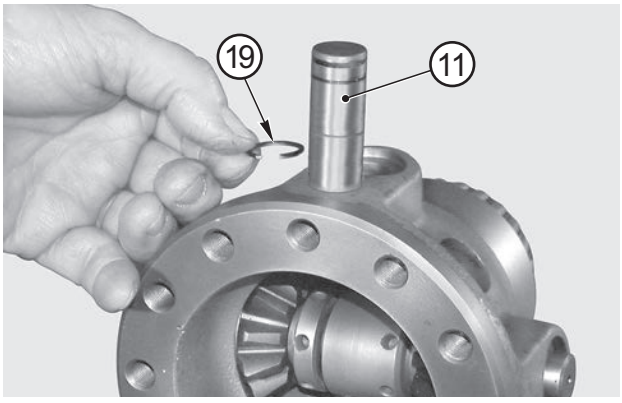


FIGURE 21: Fit snap rings (19) onto the pins (11).

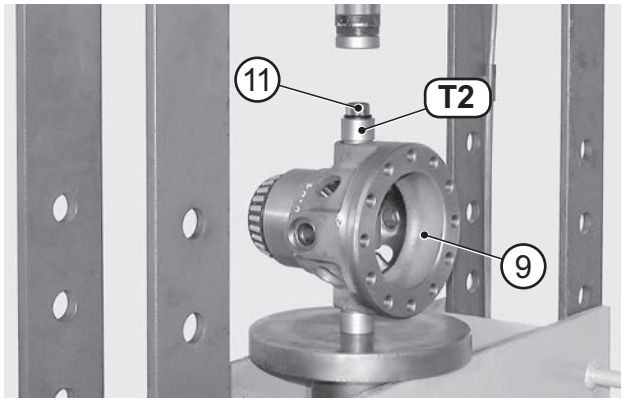


FIGURE 22: Position the differential unit (9) under the press, position bushing T2 (See drawing T2 p. 139) and insert the planetary pin (11).

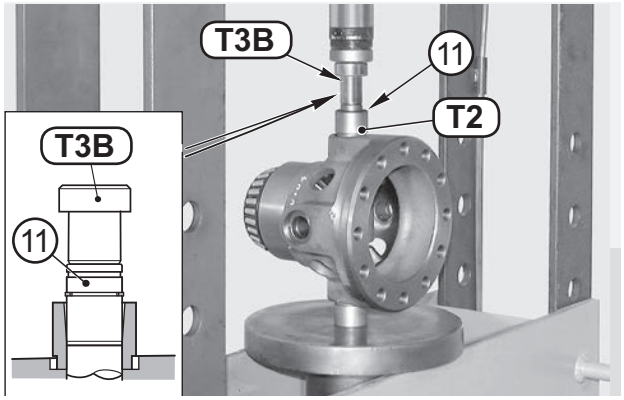


FIGURE 23: Place press tool T3B (See drawing T3 p. 139) on top of the planetary pin (11).

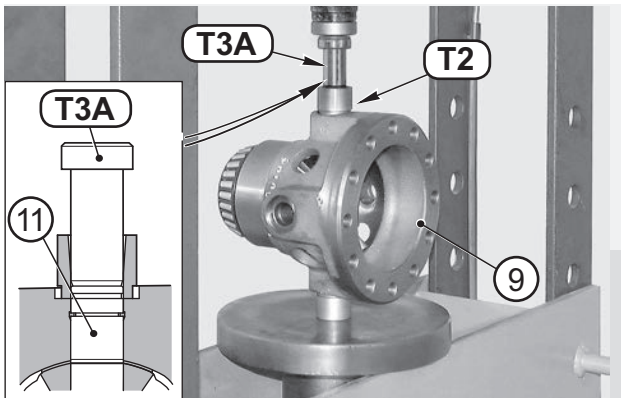


FIGURE 24: Press press tool T3B (See drawing T3 p. 139) as far down as it will go.

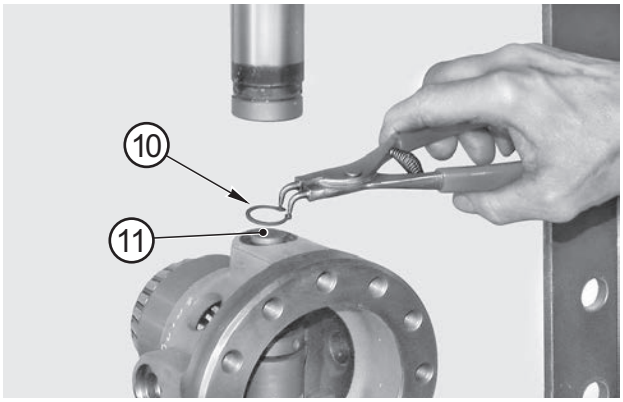


FIGURE 25: Remove press tool T3B (See drawing T3 p. 139), bushing T2 (See drawing T2 p. 139) and fit the snap ring (10) onto the pin (11).

⚠CAUTION

Make sure that the snap ring centers seat and positions itself on the differential unit face.

Repeat the operations on the other planetary pins.

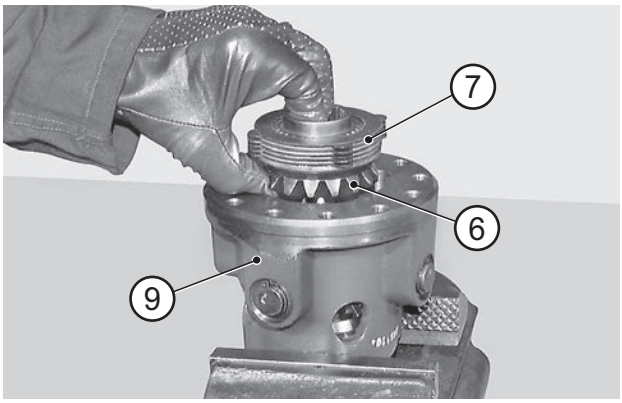


FIGURE 26: Check that planetary have a light clearance in relation to the first planetary gear.
Position the second differential side gear (6) and the second friction disc assembly (7) into the differential unit (9).

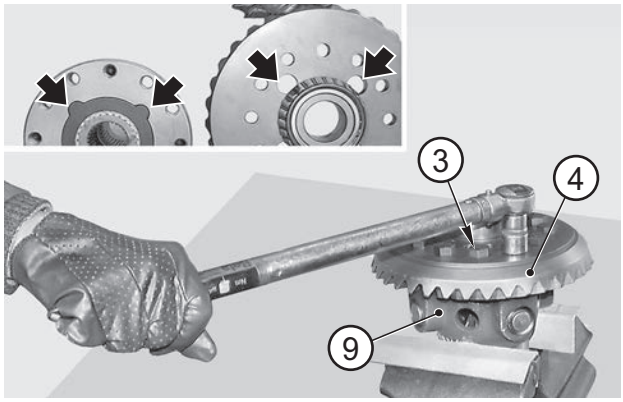


FIGURE 27: Line the lubrication holes up with the slots in the differential carrier. Orient the holes of the crown (4) towards the notches of the braking unit. Position the crown (4) on the differential unit (9) and lock it with the screws (3) previously coated with Loctite 242.
Torque wrench setting for screws: 128 - 142 N·m.

NOTE:

Tighten screws using the criss-cross method.

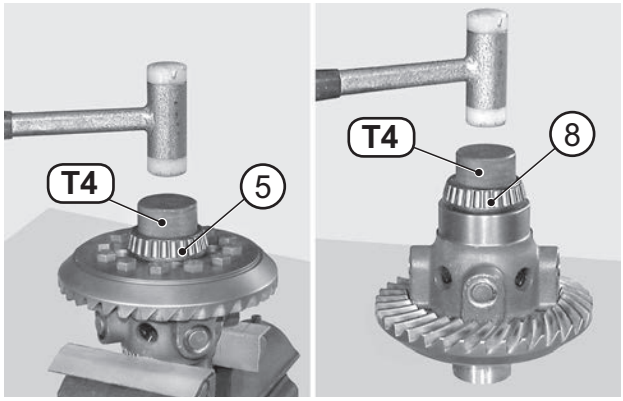


FIGURE 28: If bearings (5) and (8) have been removed, install them using tool T4 (See drawing T4 p. 140).

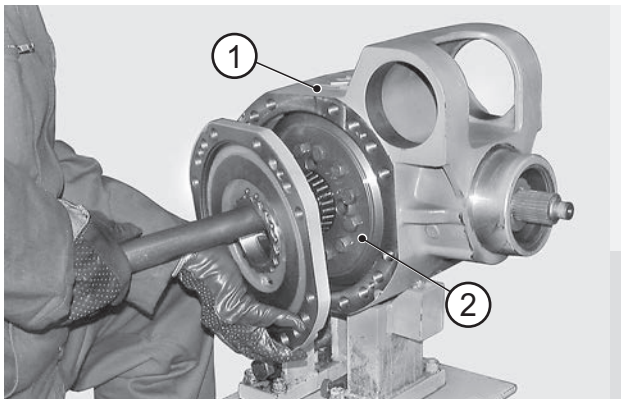
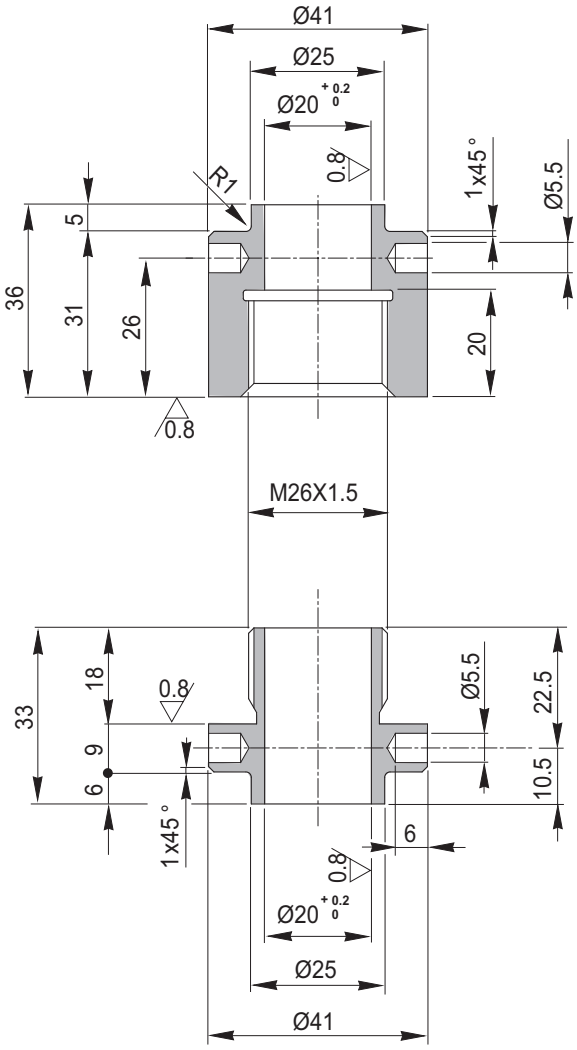


FIGURE 29: Install the whole differential assembly (2) into the central body (1).
For details, see DIFFERENTIAL UNIT p. 55.

SPECIAL TOOLS

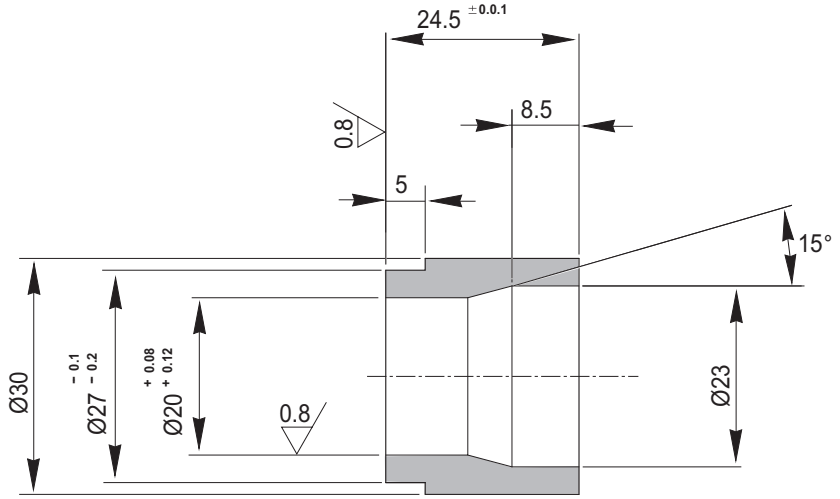
T1

P/N: 3708



T2

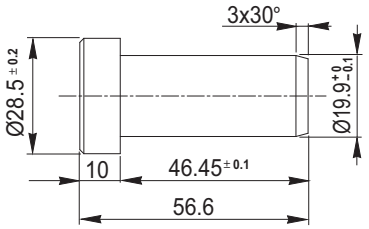
P/N: 3424



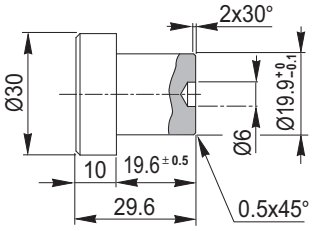
T3

P/N: 2306

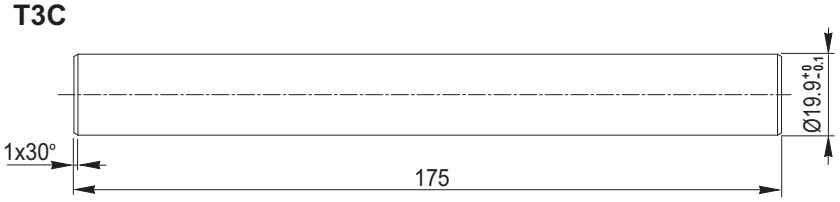
T3A



T3B

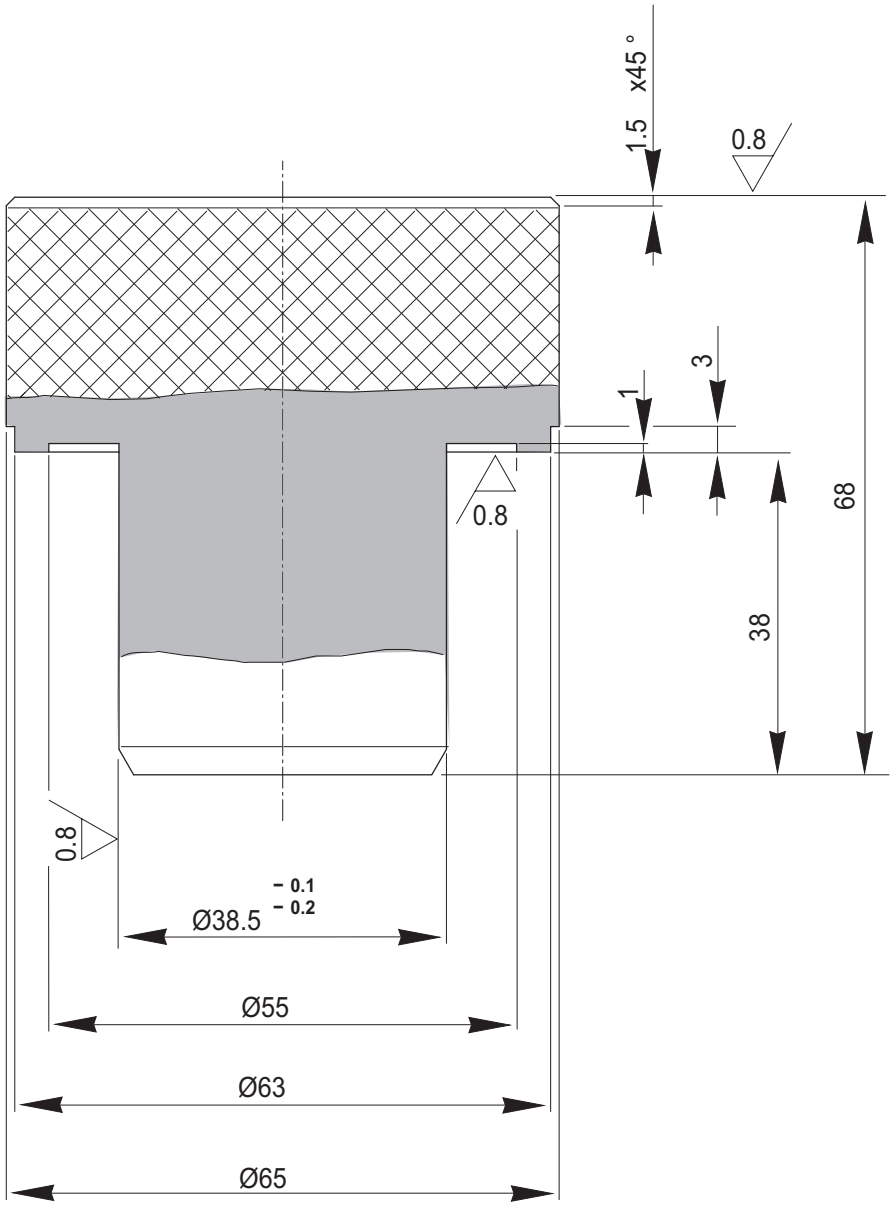


T3C



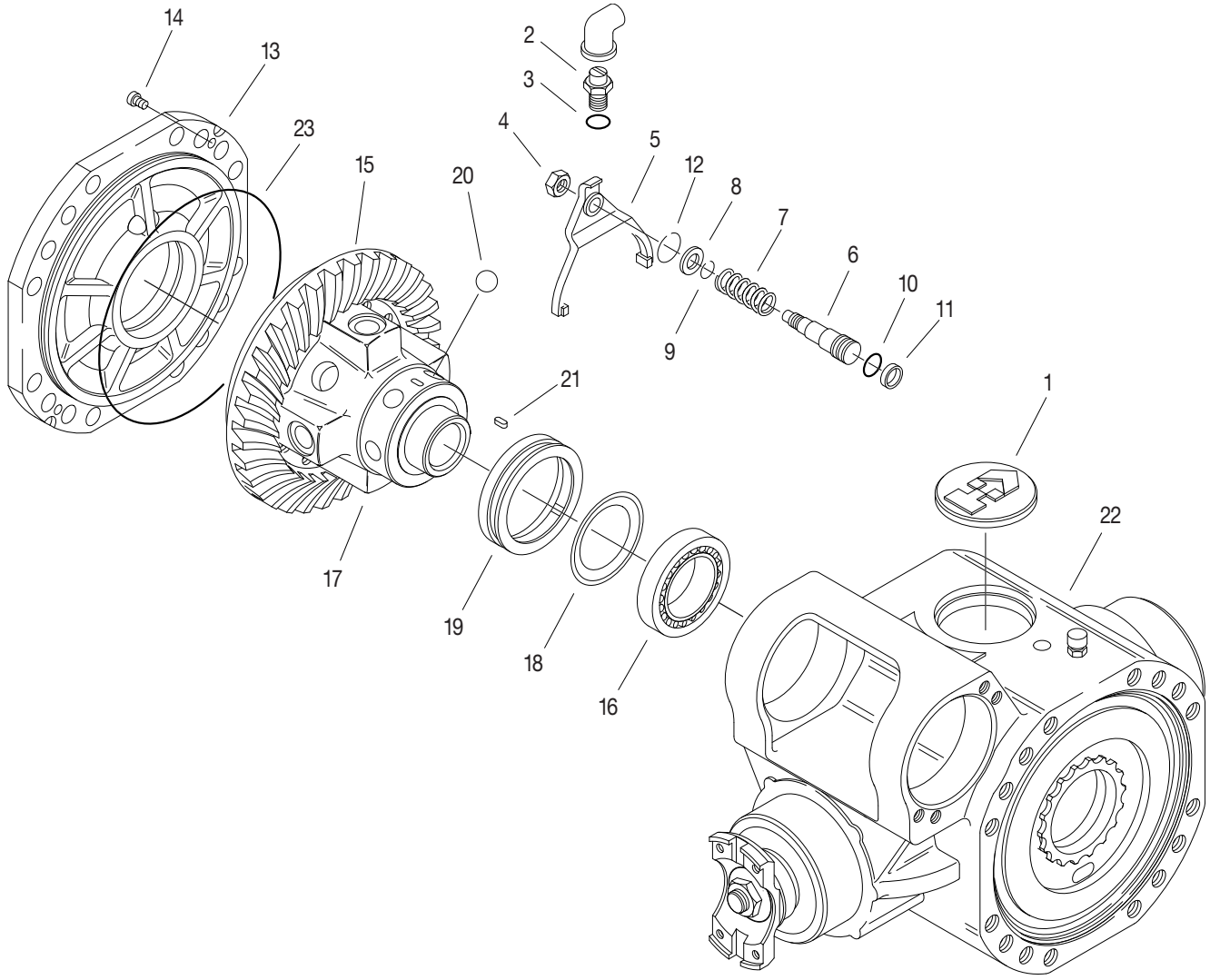
T4

P/N: 3332



HYDRAULIC DIFFERENTIAL LOCK

EXPLODED VIEW



DISASSEMBLY

⚠CAUTION

Before draining oil, release the internal pressure, for details see OIL DRAINING MANDATORY PROCEDURE p. 14.

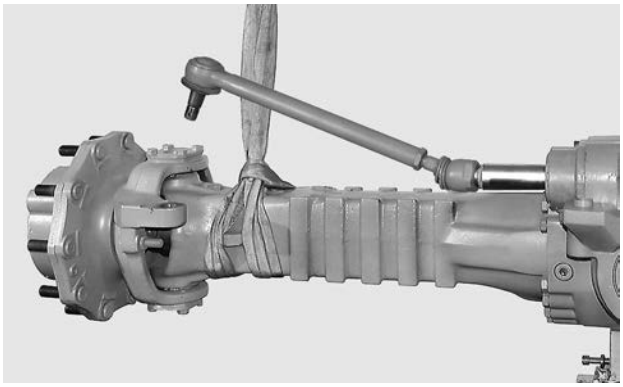


FIGURE 1: Remove the arms.
For details, see CHECKING WEAR AND REPLACING THE BRAKING DISCS p. 19.

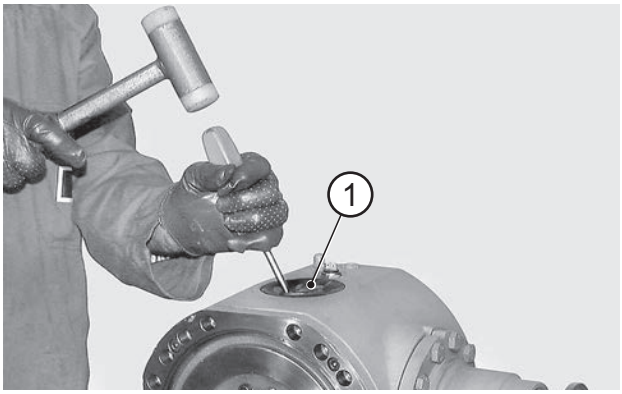


FIGURE 2: Remove the top cap (1).

NOTE:

The cap must be replaced each time the unit is disassembled.

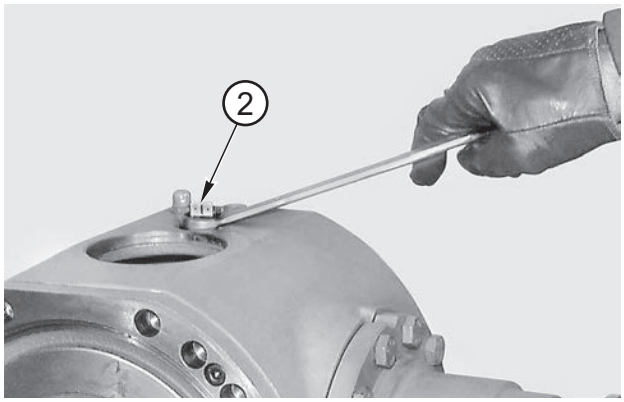


FIGURE 3: Remove the security switch (2).

NOTE:

Check the state of the o-ring (3).

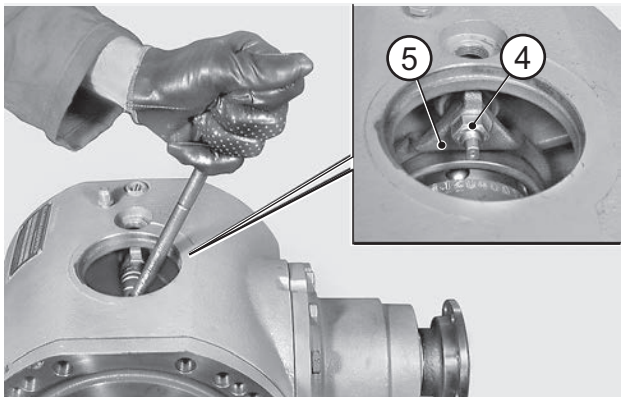


FIGURE 4: Loosen the lock nut (4) of selector fork (5) by approximately 2 turns.

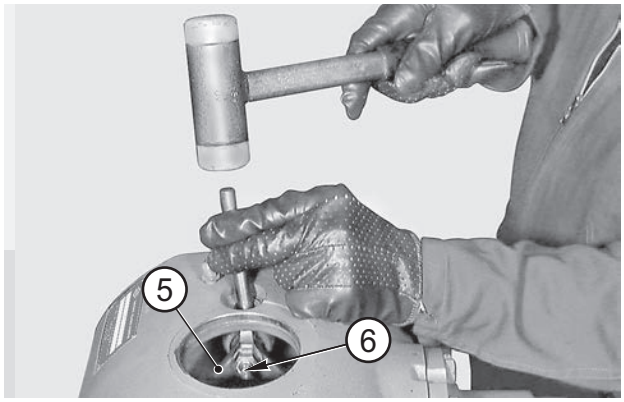


FIGURE 5: Using a metal punch and a hammer, disengage the selector fork (5) from piston cone (6).

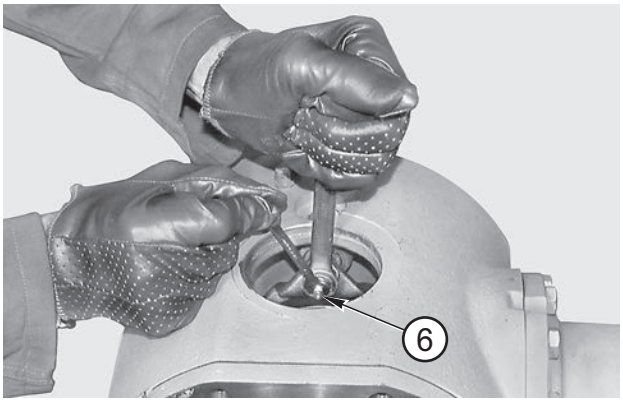


FIGURE 6: Using two wrenches, lock piston (6) and remove nut (4).

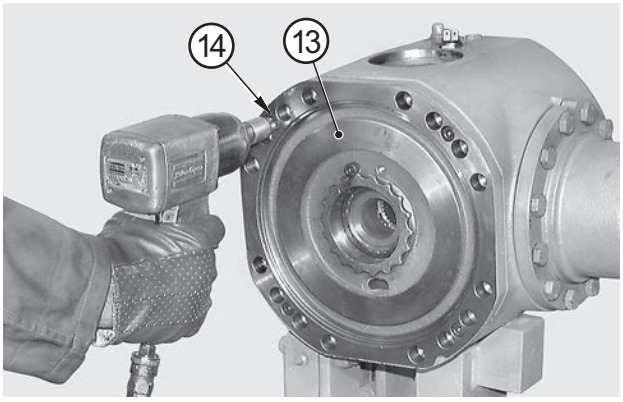


FIGURE 7: Remove screws (14) and remove the intermediate cover (13).

NOTE:

Support the differential unit with a lever.

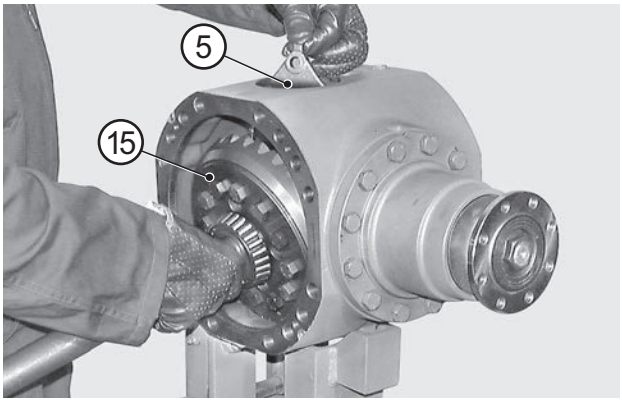


FIGURE 8: Disconnect selector fork (5) from piston (6). While holding the selector up, remove the differential unit (15).

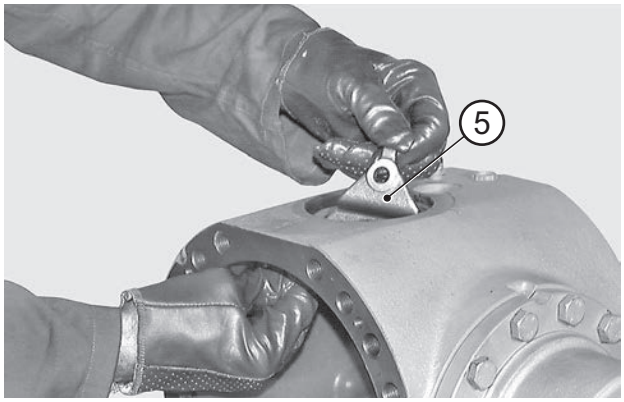


FIGURE 9: Extract selector fork (5).

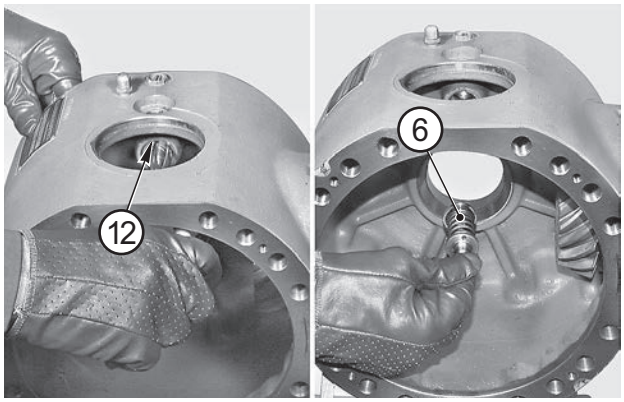


FIGURE 10: Remove snap ring (12) and whole piston (6).

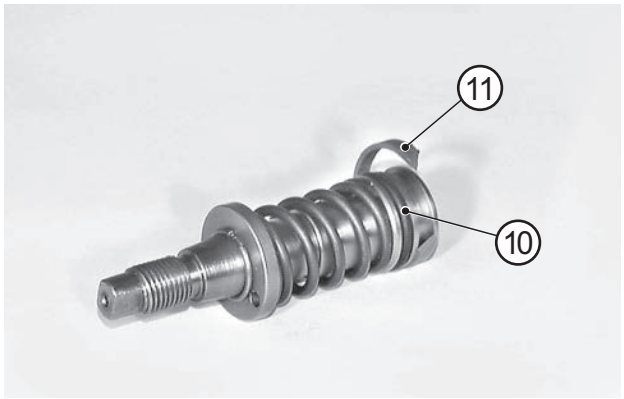


FIGURE 11: Remove guide ring (11) and o-ring (10).

NOTE:

The guide ring (11) and o-ring (10) must be replaced each time the unit is disassembled.

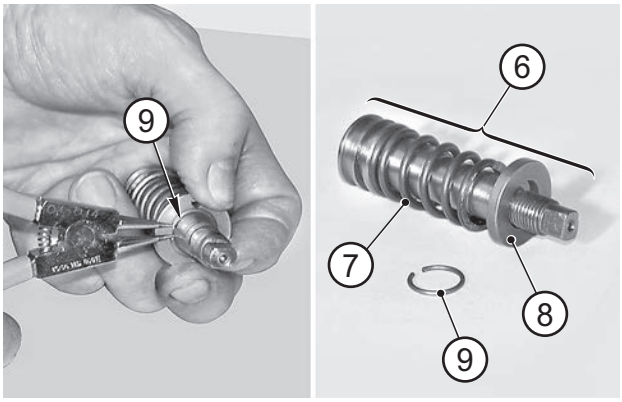


FIGURE 12: Remove snap ring (9) and take piston unit (6) apart. Remove all component parts.

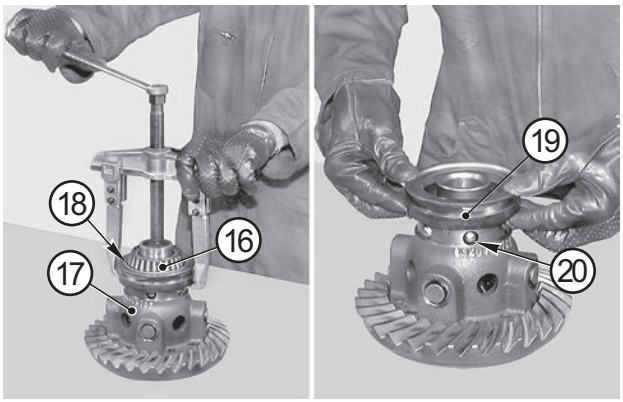


FIGURE 13: Remove bearing (16) from the differential carrier (17) as well as the stop ring (18), the sleeve (19) and the spheres (20).

NOTE:

Write down the direction of assembly of the stop ring (18).

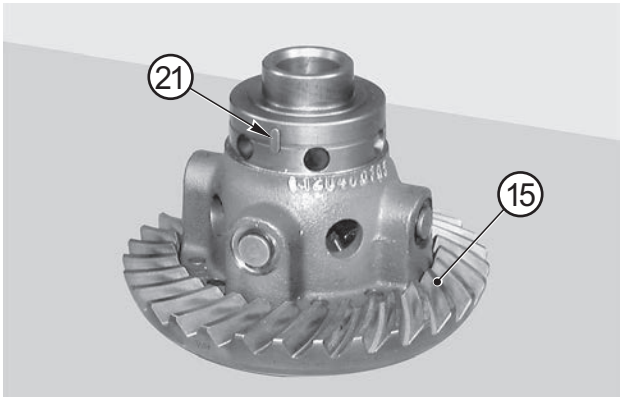


FIGURE 14: ONLY IF NECESSARY
Remove the key (21) and disassemble the differential unit (15).
For details, see DIFFERENTIAL UNIT p. 55.

ASSEMBLY

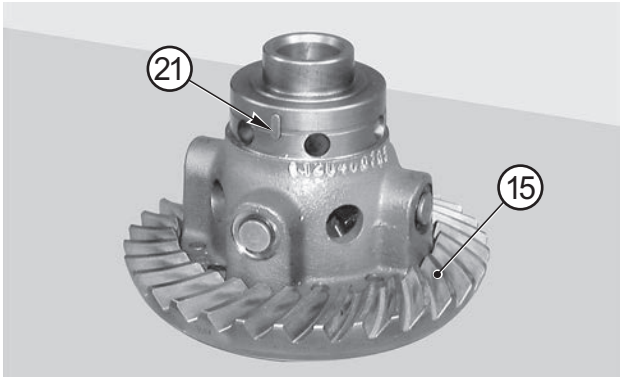


FIGURE 15: ONLY IF PREVIOUSLY DISASSEMBLED
Assemble the differential unit (15).
(For details, see DIFFERENTIAL UNIT p. 55).
Position the key (21) in the differential unit (19).

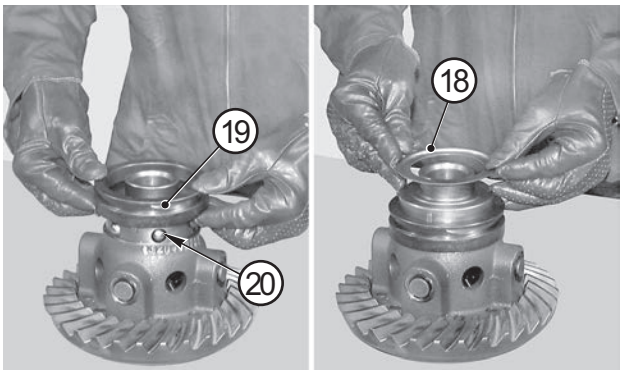


FIGURE 16: Install spheres (20), sleeve (19) and stop ring (18).

NOTE:

Pay great attention to ring orientation (18).

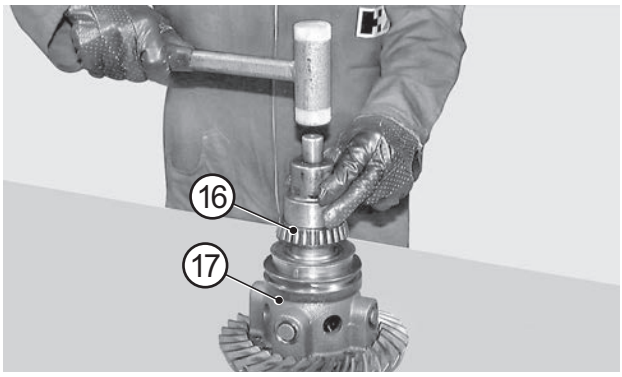


FIGURE 17: Install bearing (16) onto the differential carrier (17).

NOTE:

Make sure that the bearing is well set in the differential carrier.

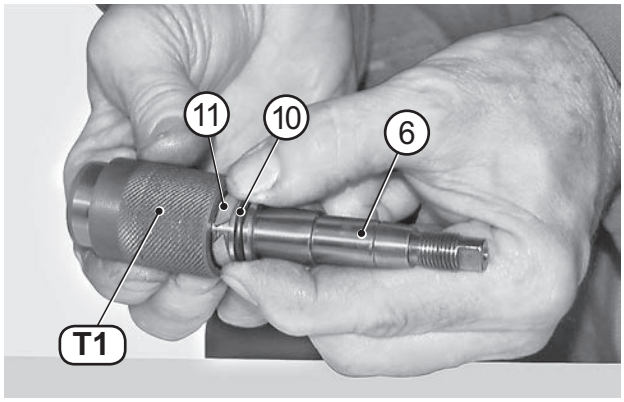


FIGURE 18: Fit o-ring (10) and guide ring (11) onto the piston (6). Lubricate seals and insert the assembly into tool T1 (See drawing T1 p. 147).

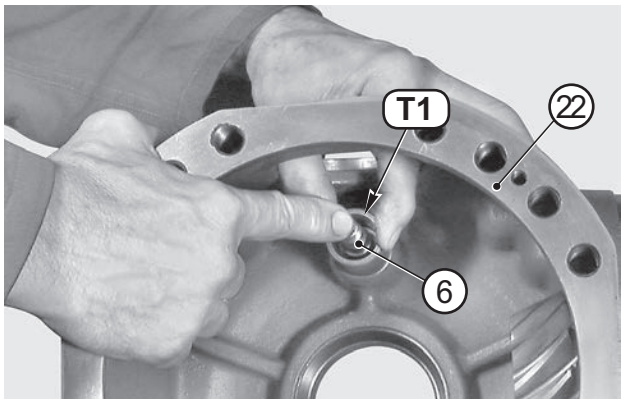


FIGURE 19: Insert tool T1 (See drawing T1 p. 147) in the central unit (22) and push the piston (6) into the seat.
Remove tool T1 (See drawing T1 p. 147).

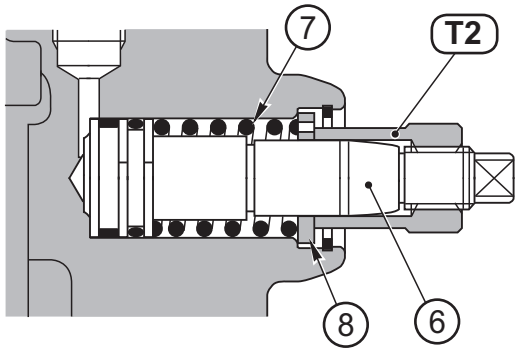


FIGURE 20: Install spring (7) and washer (8) on the piston (6) and install tool T2 (See drawing T2 p. 147).

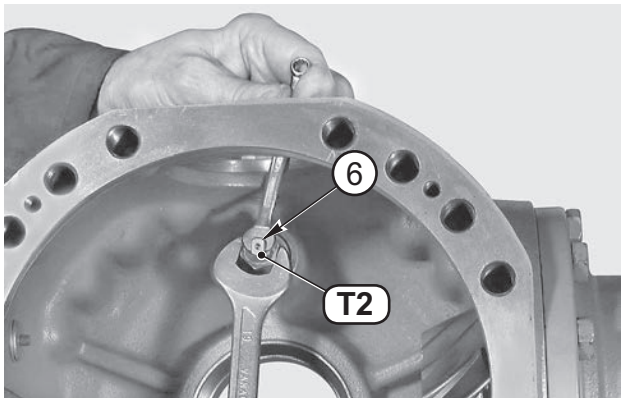


FIGURE 21: Screw tool T2 (See drawing T2 p. 147) on the thread of the piston (6) to compress the spring (7) and vacate the seat for installing the snap ring (12).

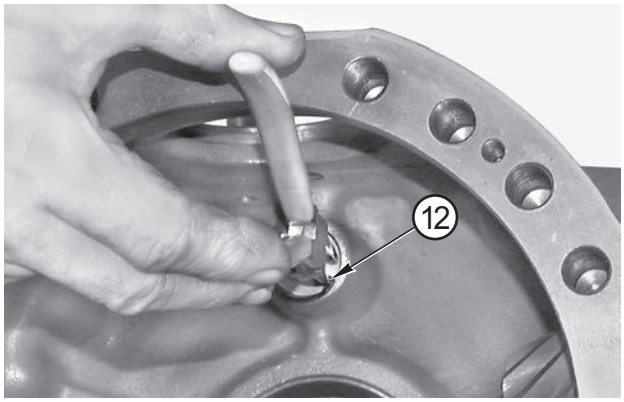


FIGURE 22: Install the snap ring (12).
Remove tool T2 (See drawing T2 p. 147) and fit the snap ring (9) of spring (7).

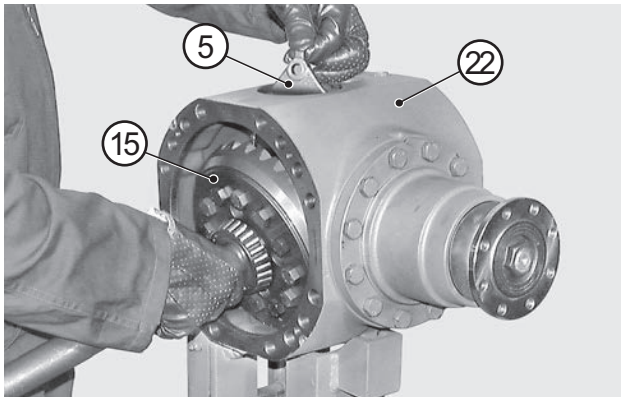


FIGURE 23: Insert the selector fork (5) and the differential unit (15) into the central unit (22).
Engage the selector fork (5) in the coupling (19) and on the piston (6).

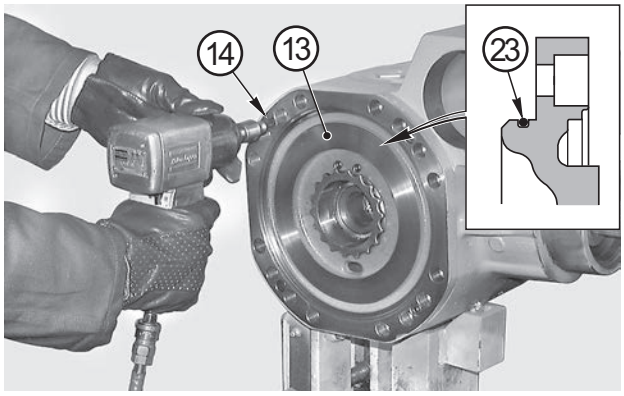


FIGURE 24: Install the intermediate cover (13) and lock it with screws (14). Tighten screws using a torque wrench setting of 23.8 - 26.2 N·m.

NOTE:

Carefully check the state of the o-ring (23).

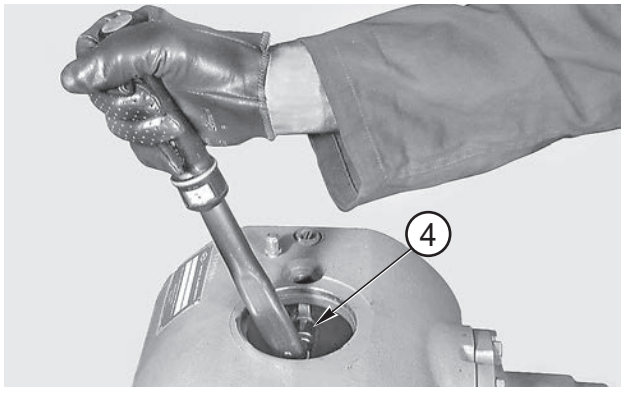


FIGURE 25: Install the lock nut (4) of the selector fork (5) and lock it with a torque wrench set to a torque of 70 - 75 N·m.

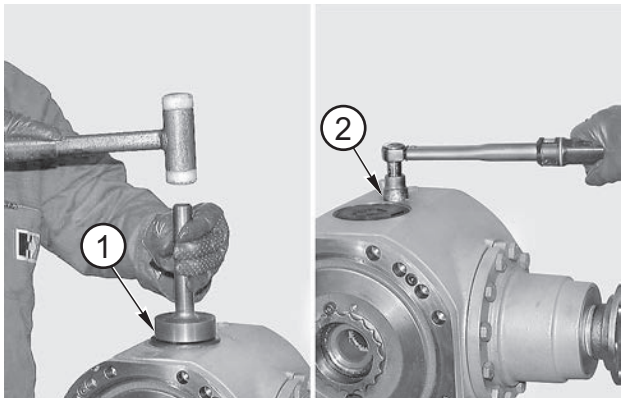
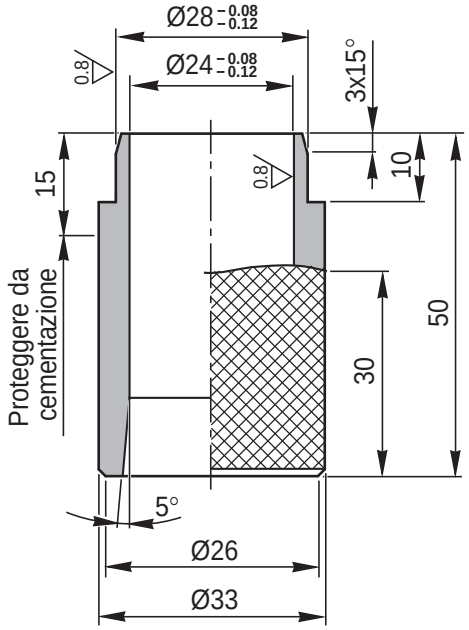


FIGURE 26: Install the security switch (2) complete with o-ring; torque wrench setting: maximum 30 N·m.
If necessary, adjust differential unit clearances. (see DIFFERENTIAL UNIT p. 55).
Install the top cap (1) and the arms. (For details, see CHECKING WEAR AND REPLACING THE BRAKING DISCS p. 19).

SPECIAL TOOLS

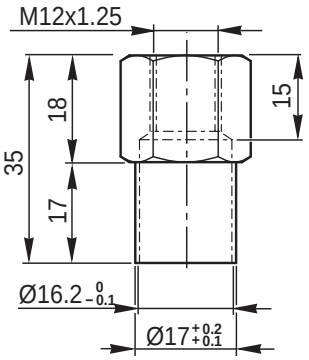
T1

P/N: 3543



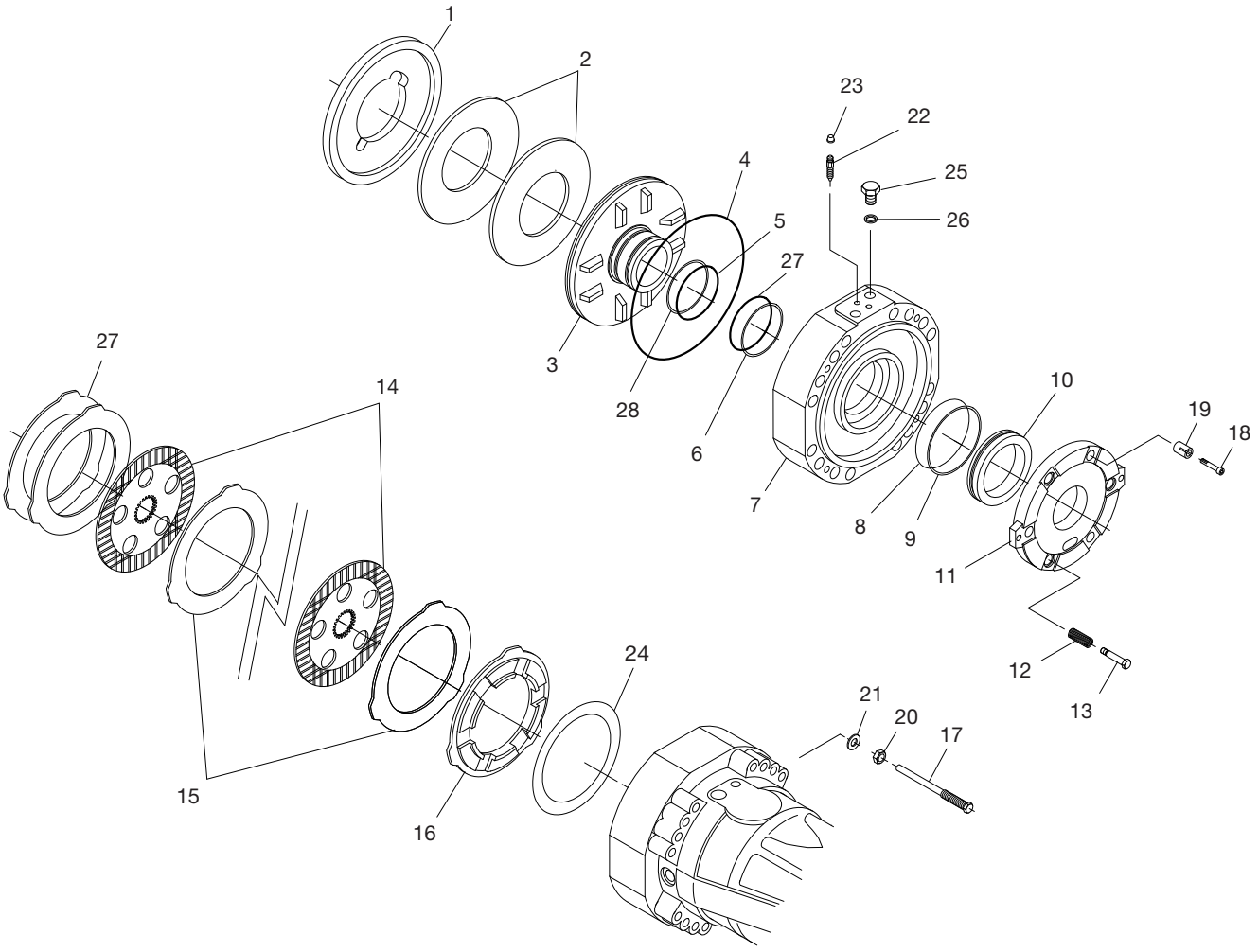
T2

P/N: 2316



HYDRAULIC NEGATIVE BRAKE

EXPLODED VIEW



DISASSEMBLY

⚠DANGER

Before maintaining brakes, when the axle is installed on vehicle, follow all safety instructions in the Original Equipment Manufacturer (OEM) manual that came with the vehicle.

⚠CAUTION

Before draining oil, release the internal pressure, for details see OIL DRAINING MANDATORY PROCEDURE p. 14.

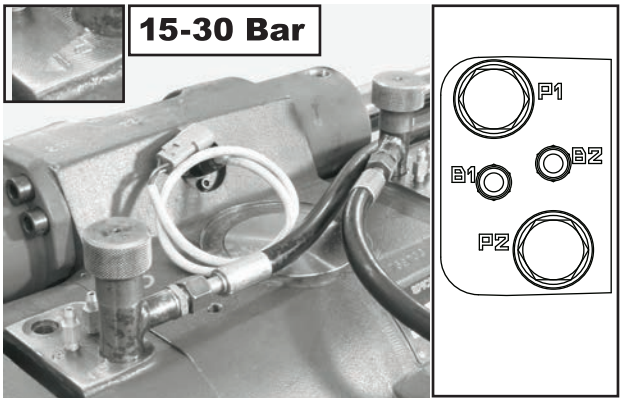


FIGURE 1: Connect an external pump to the union piece " P1 " of the negative brake and introduce a pressure of 15 - 30 bar to eliminate the pressure of the Belleville washers (2).

⚠DANGER

Always check that the hydraulic circuit test for leaks under pressure. Always use a cardboard or a panel to control the loss.

A leak from a hole of the size of a pin can cause serious injury. If fluid is injected into the skin it is necessary to seek immediate medical care.

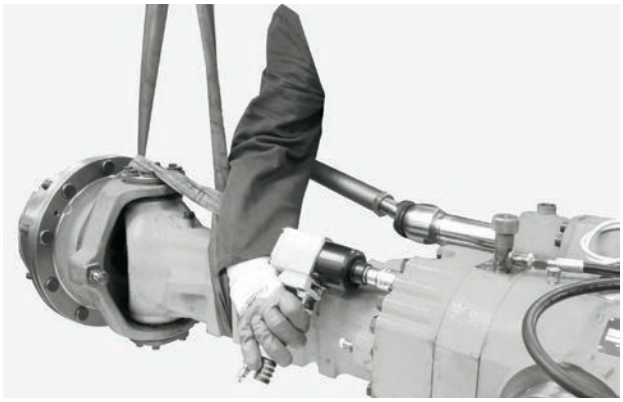


FIGURE 2: Sling the arm to be removed and connect it to a hoist.
Loosen and remove screws (17) .

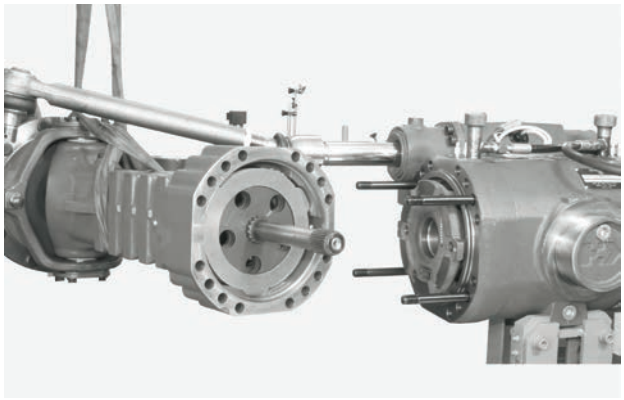


FIGURE 3: Remove arm together with brakes and axle shafts; lay down the arm vertically.

FIGURE 4: Gradually release the pressure in the braking circuit, bringing it to zero through the external pump.

⚠DANGER

Do not remove any part of the hydraulic circuit without having completely released the hydraulic pressure.

The removal of pressurized parts or loss caused from releasing these components can cause serious injuries and even death. A leak from a hole of the size of a pin can cause serious injury. If fluid is injected into the skin it is necessary to seek immediate medical care.

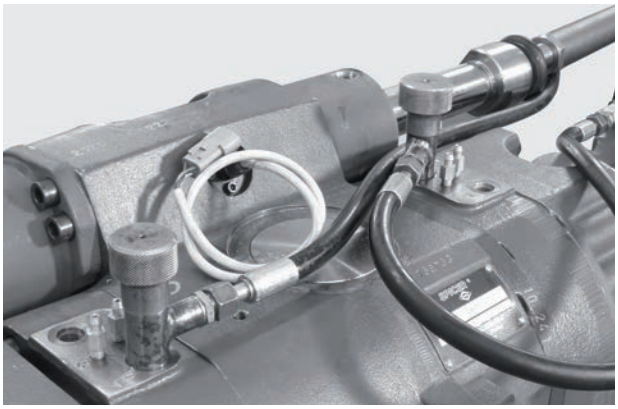


FIGURE 5: Gradually loosen the sleeve and remove.

⚠DANGER

Carefully check that the hydraulic pressure is discharged completely before removing the external pump sleeve connected to the brake.

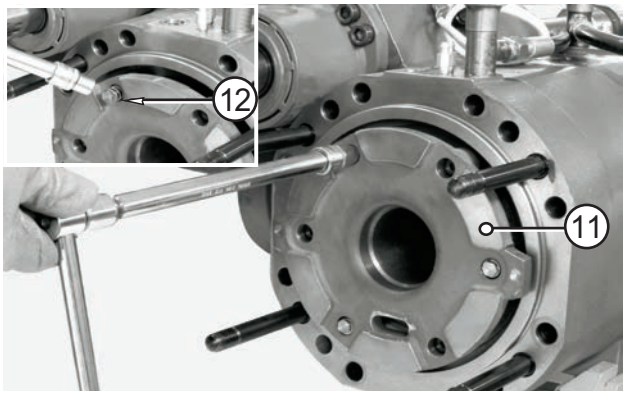


FIGURE 6: Remove the reversal springs (12) from the cover (11).

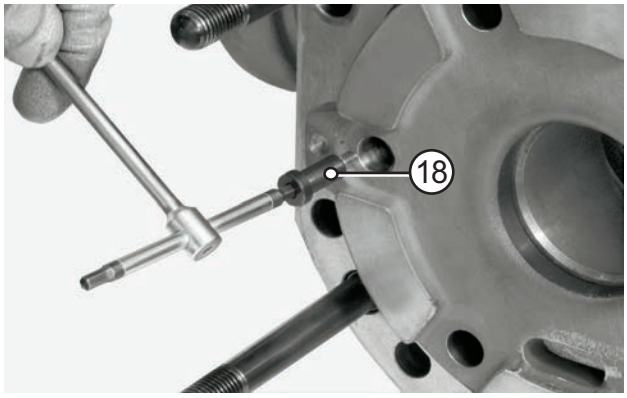


FIGURE 7: Remove the pin screws (18) guiding the cover (11).

⚠CAUTION

If the screws are to be replaced, write down the different colors for the different brake gaps.

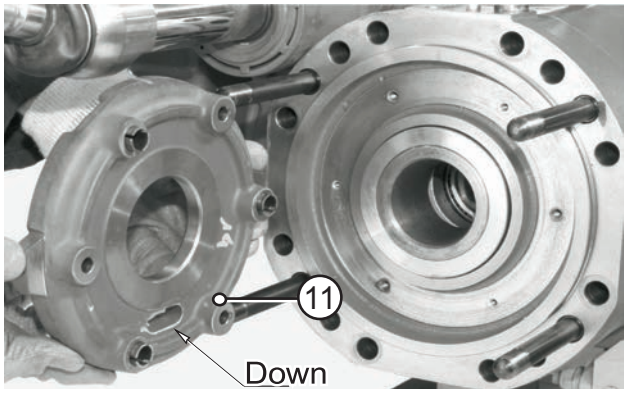


FIGURE 8: Write down the order of assembly and remove the counterwasher (11).

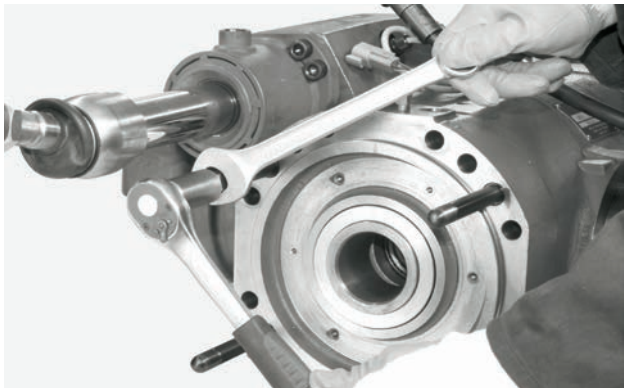


FIGURE 9: Loosen the studs and remove two of them.

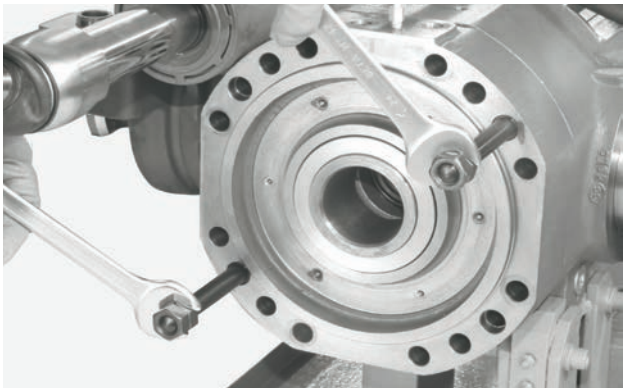


FIGURE 10: Loosen the studs and remove two of them.

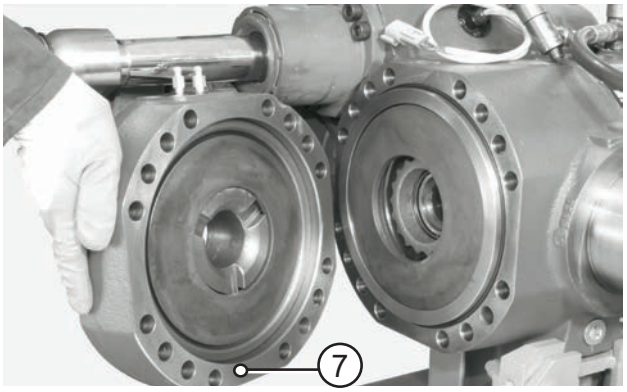


FIGURE 11: Move the cover (7) outwards.

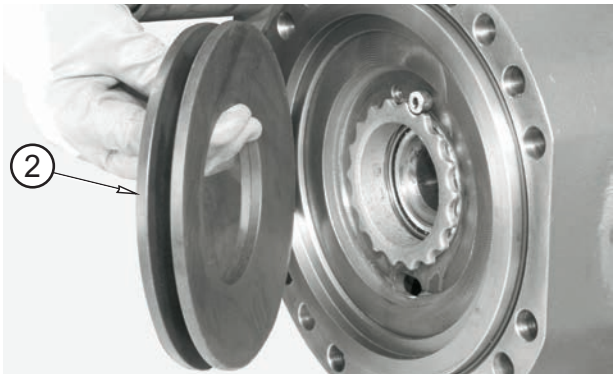


FIGURE 12: Remove the Belleville washers (2) and write down direction of assembly.

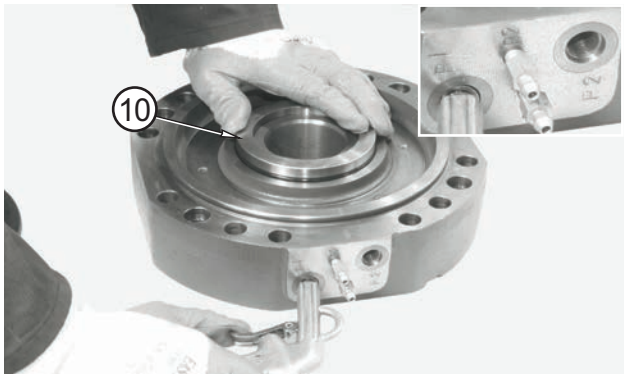


FIGURE 13: Slowly introduce low-pressure compressed air through the connection member for the service brake, in order to extract the piston (10).

⚠CAUTION

Hold the piston (10) back, as it may be suddenly ejected and damaged.

NOTE:

The o-rings must be replaced each time the unit is disassembled.

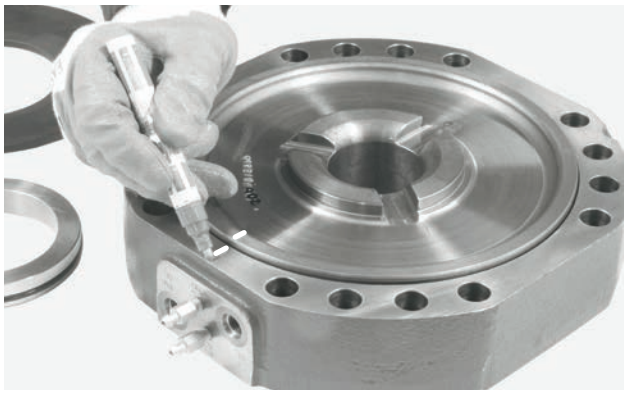


FIGURE 14: Write down their order of assembly and mark and remove negative piston.

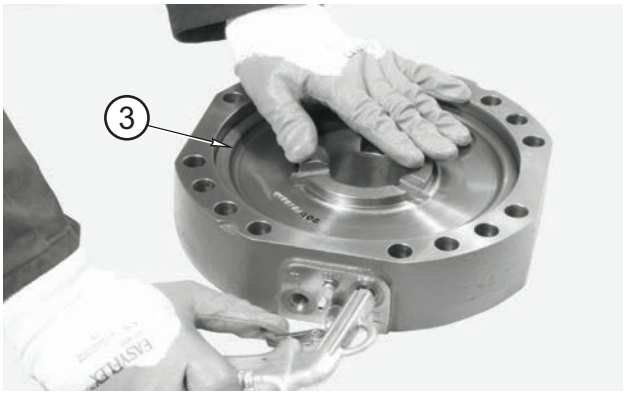


FIGURE 15: Slowly introduce low-pressure compressed air through the connection member for the negative brake, in order to extract the piston (3).

⚠CAUTION

Hold the piston (3) back, as it may be suddenly ejected and damaged.

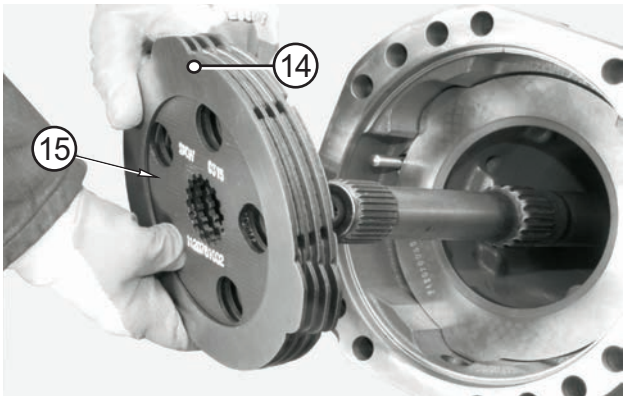


FIGURE 16: Remove brake discs (14) and (15), writing down direction of assembly.

NOTE:

If disks are not to be replaced, avoid changing their position.

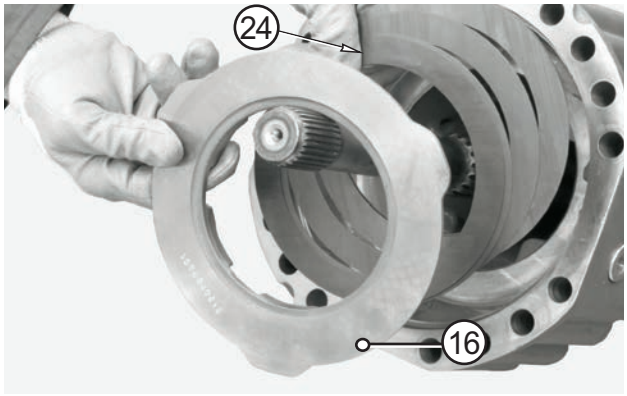


FIGURE 17: Remove braking discs (16) and shims (24), writing down direction of assembly.

NOTE:

If disks are not to be replaced, avoid changing their position.

ASSEMBLY

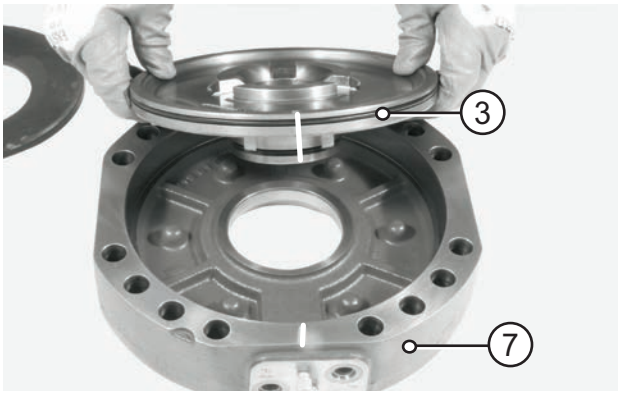


FIGURE 18: Fit o-rings (4)(28)(27)(5)(6) onto the piston (3). Lubricate the piston and the o-rings and install the unit into the cylinder (7).

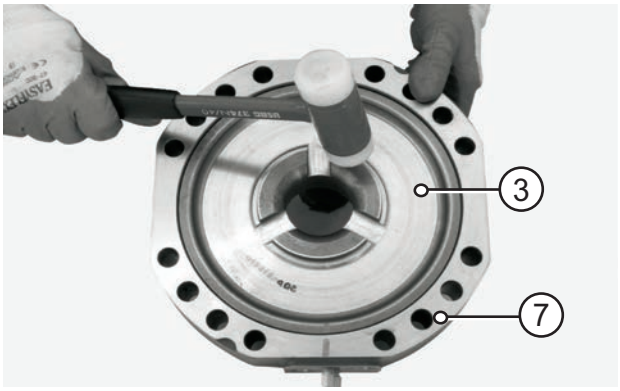


FIGURE 19: Using a plastic hammer, insert the piston (3) into the cylinder (7).

NOTE:

Lightly hammer all around the edge in an alternate sequence.

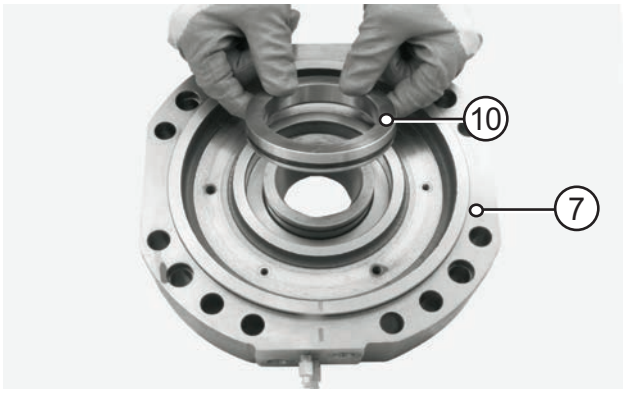
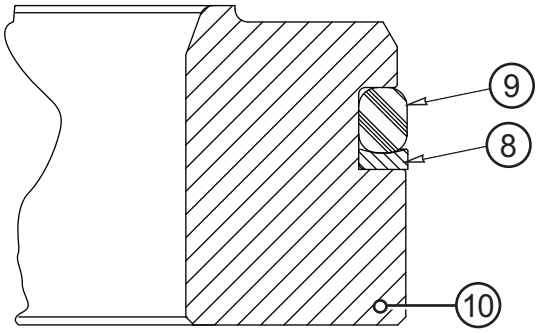


FIGURE 20: Fit o-rings (9) and (8) onto the piston (10). Lubricate the piston and the o-rings and install the unit into the cylinder (7).



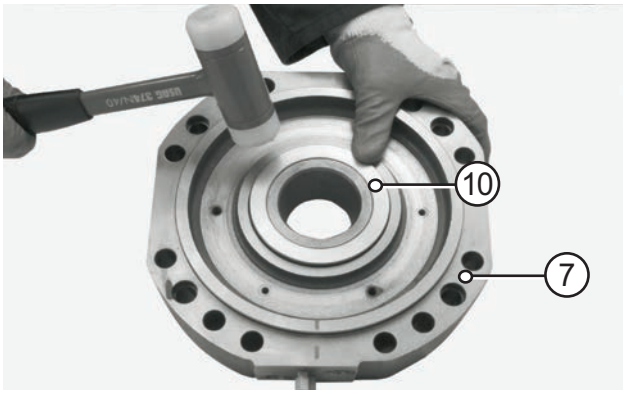


FIGURE 21: Using a plastic hammer, insert the piston (10) into the cylinder (7).

NOTE:

Lightly hammer all around the edge in an alternate sequence.

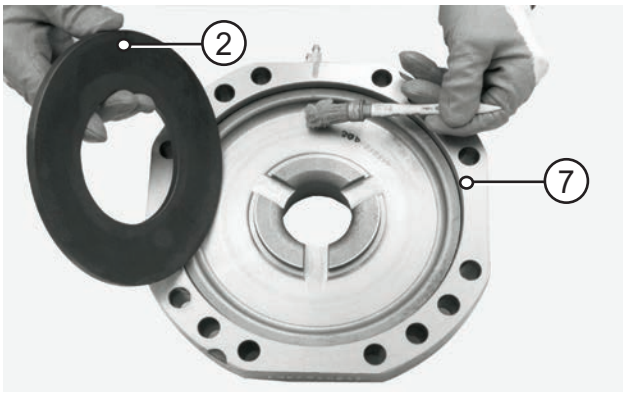


FIGURE 22: Apply grease and position the Belleville washers (2) and engage the cylinder (7).

NOTE:

Check the sense of direction of washers (7) and relative centering.

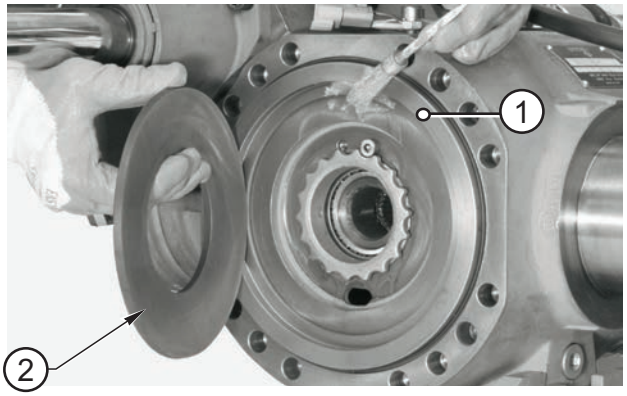


FIGURE 23: Apply grease and position the Belleville washers (2) and engage the cylinder (1).

NOTE:

Check the sense of direction of washers (2) and relative centering.

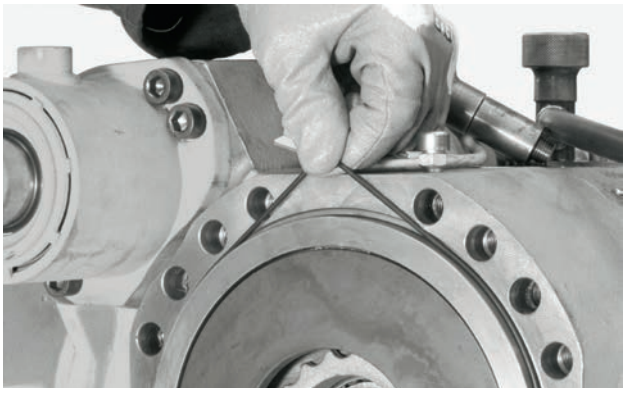


FIGURE 24: Check quality and position of the cylinder's o-ring.

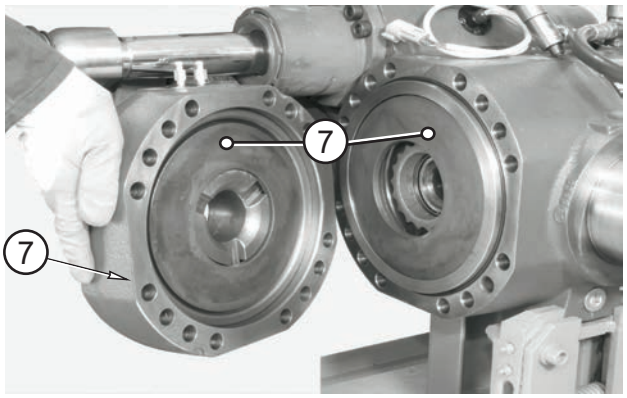


FIGURE 25: Position the Belleville washers (2) and engage the cylinder (7).

NOTE:

Check the sense of direction of washers (2) and relative centring.

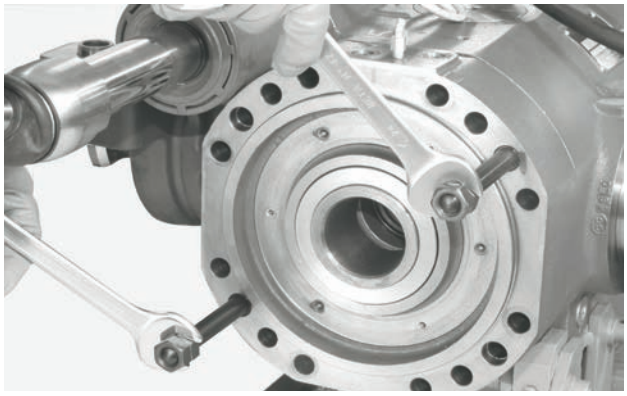


FIGURE 26: Lock the cylinder.

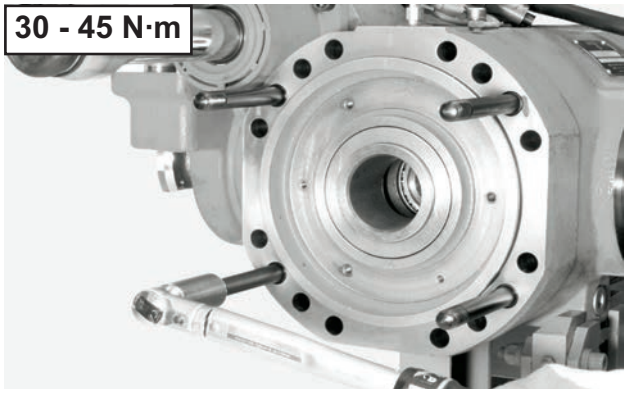


FIGURE 27: Tightening the studs with a torque wrench set to a torque of 30 - 45 N·m.

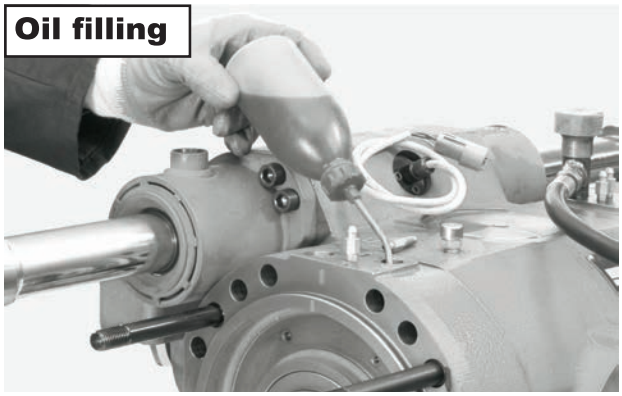


FIGURE 28: Fill with ATF oil. For details see MAINTENANCE INTERVALS p. 15.

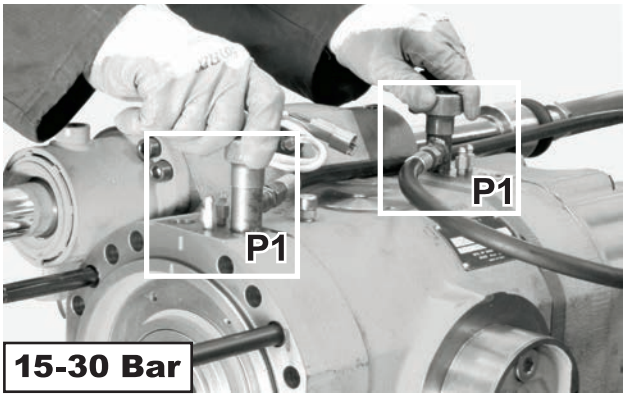


FIGURE 29: Connect an external pump to the negative brake and introduce pressure to 15 - 30 bar.

⚠DANGER

Always check that the hydraulic circuit test for leaks under pressure. Always use a cardboard or a panel to control the loss.

A leak from a hole of the size of a pin can cause serious injury. If fluid is injected into the skin it is necessary to seek immediate medical care.

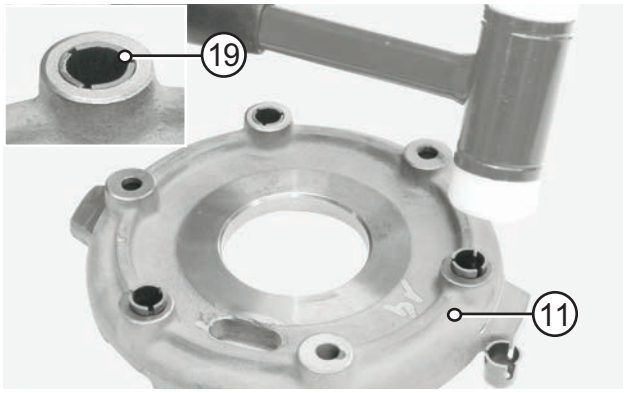


FIGURE 30: Insert the stroke automatic regulation springs (19); place them in line with the piston (11).

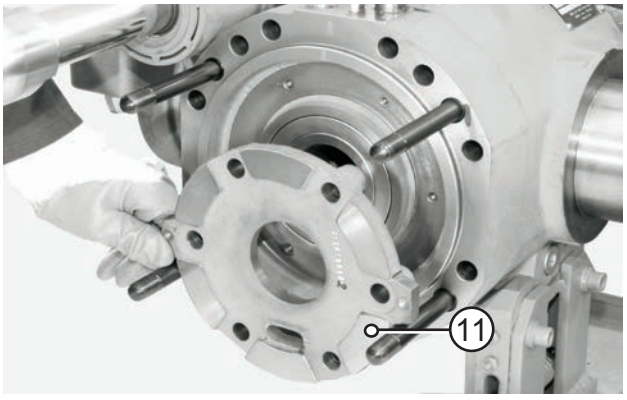


FIGURE 31: Insert the intermediate disk (11).

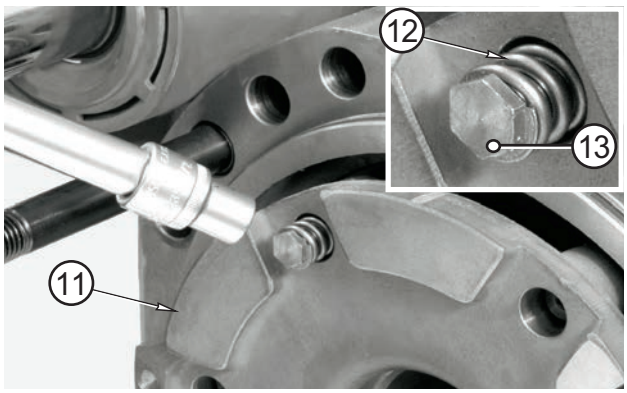


FIGURE 32: Fit the reversal springs (12)(13) on the piston (11).

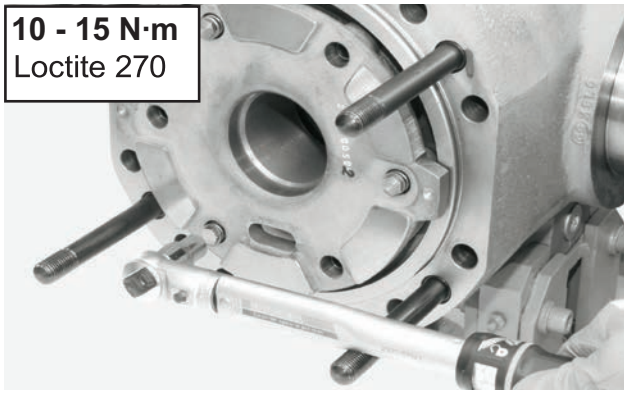


FIGURE 33: Apply LOCTITE 270 to the thread of the pistion adjustment nut.
Tighten with torque wrench setting of 10 - 15 N·m

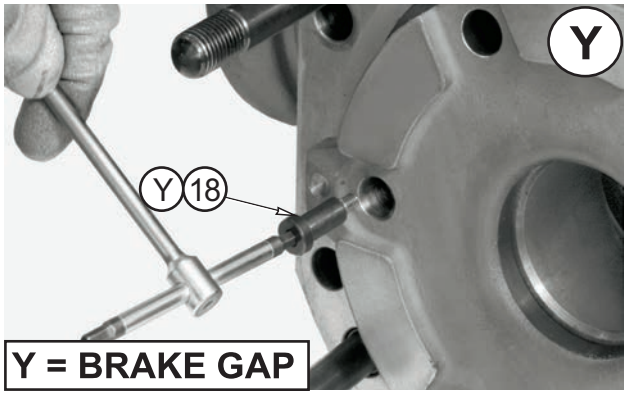


FIGURE 34: Y=brake gap
0,75mm 1,00mm 1,25mm 1,50mm
Depending on axle configuration.

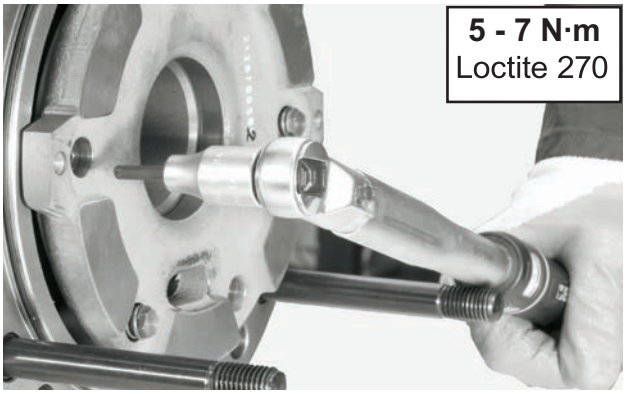


FIGURE 35: Fit the pin screws making sure that they are all of the same color.
Apply Loctite 270 to the thread.
Torque wrench setting: 5 - 7 N·m.

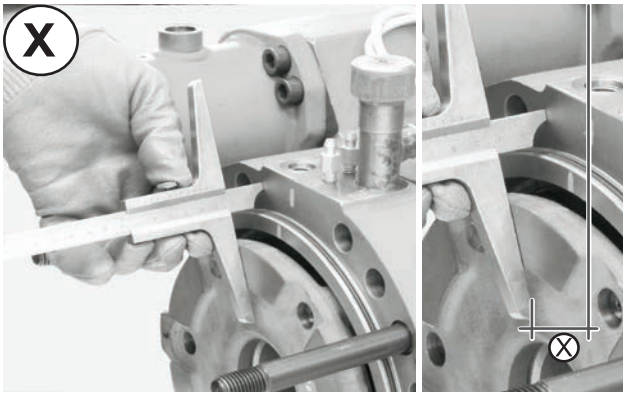


FIGURE 36: Take the measurement from the surface of the intermediate disk to the cover sealing surface with 30 bar of pressure introduced.
EXAMPLE: 25.4 mm

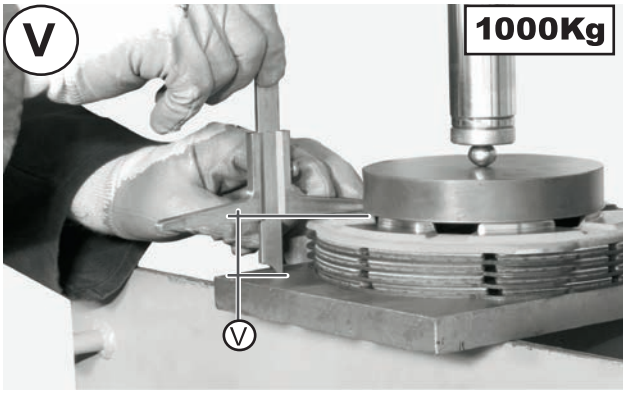


FIGURE 37: Put the brake disc pack including the shim under a press, load with 1000 kg and take the measure “V”.
EXAMPLE: V = 40 mm

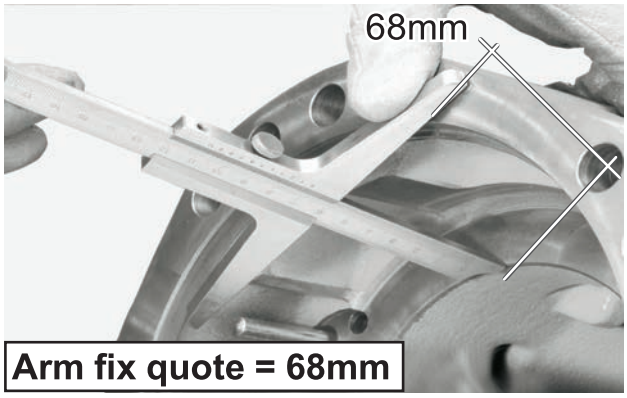


FIGURE 38: Arm fix quote = 68 mm

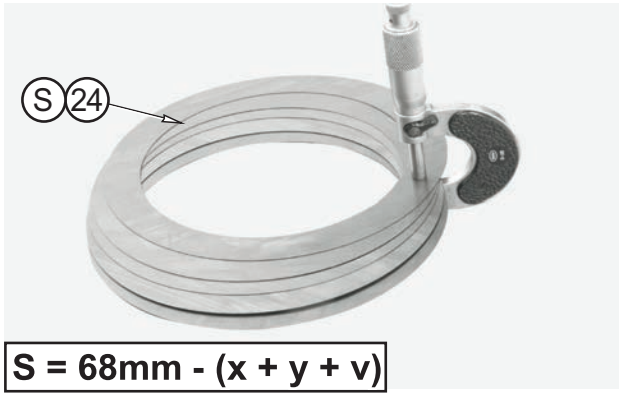
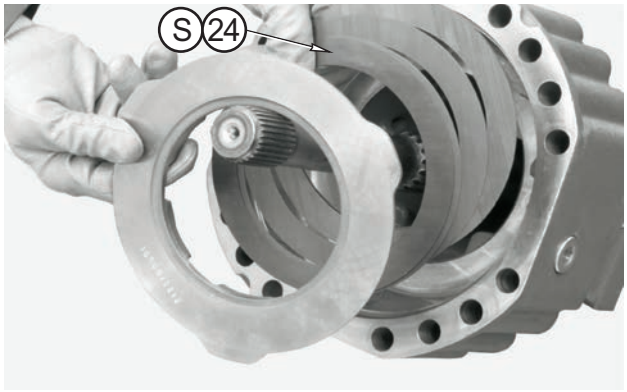


FIGURE 39: S = 68 mm - (x + y + v) = Thickness of shims to insert under the shim washer.



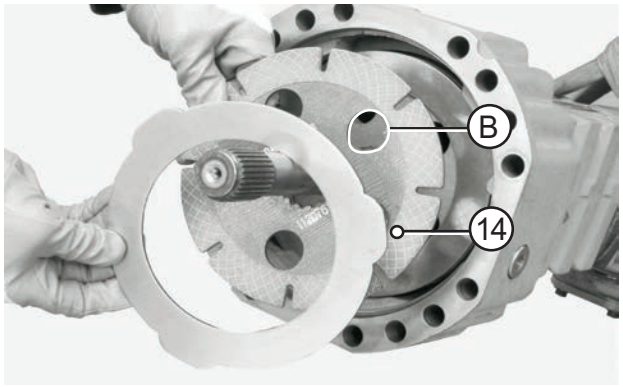
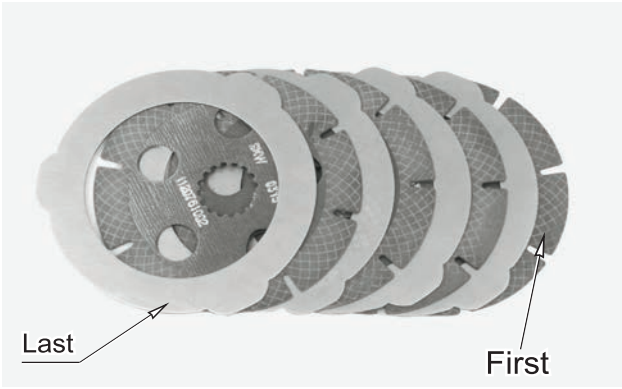


FIGURE 40: Slightly lubricate the braking disks (14) and fit them in the arm following the correct sequence; orient them so that the oil circulation holes and the marks “B” are lined up.
When installing the steel discs, the slot corresponding to the oil level cap should always be kept free.



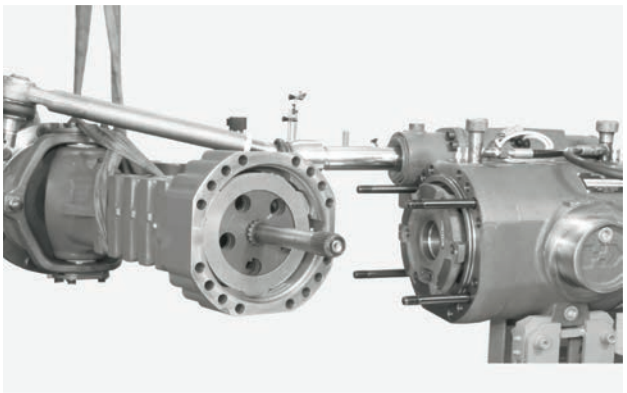


FIGURE 41: Check integrity and position of the arm's o-ring; install the complete arm.

NOTE:

To assist axle shaft centering, slightly move the wheel hub.

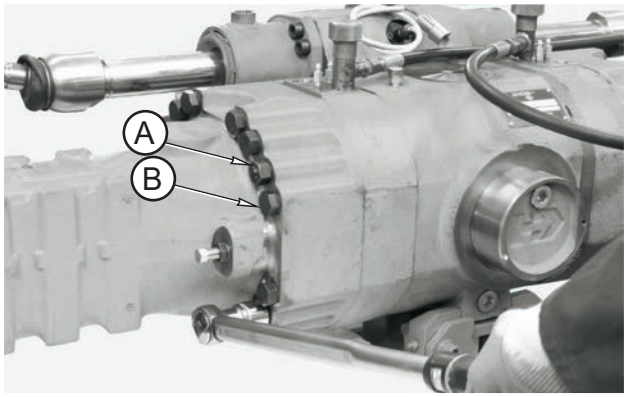


FIGURE 42: Torque wrench setting:
A = 200 N·m
B = 283 N·m.

NOTE:

Tighten using the criss-cross method.

FIGURE 43: Gradually release the pressure in the braking circuit, bringing it to zero through the external pump.

DANGER

Do not remove any part of the hydraulic circuit without having completely released the hydraulic pressure.

The removal of pressurized parts or loss caused from releasing these components can cause serious injuries and even death. A leak from a hole of the size of a pin can cause serious injury. If fluid is injected into the skin it is necessary to seek immediate medical care.

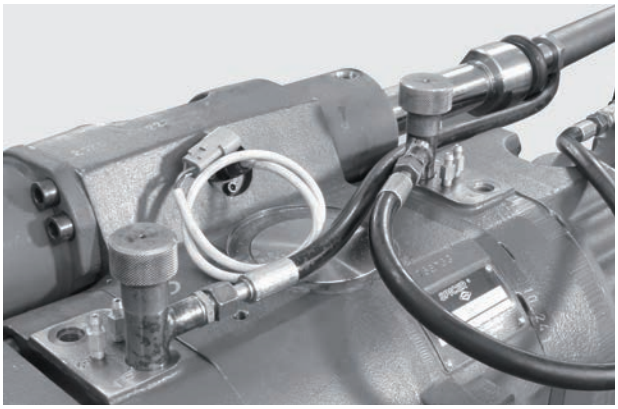


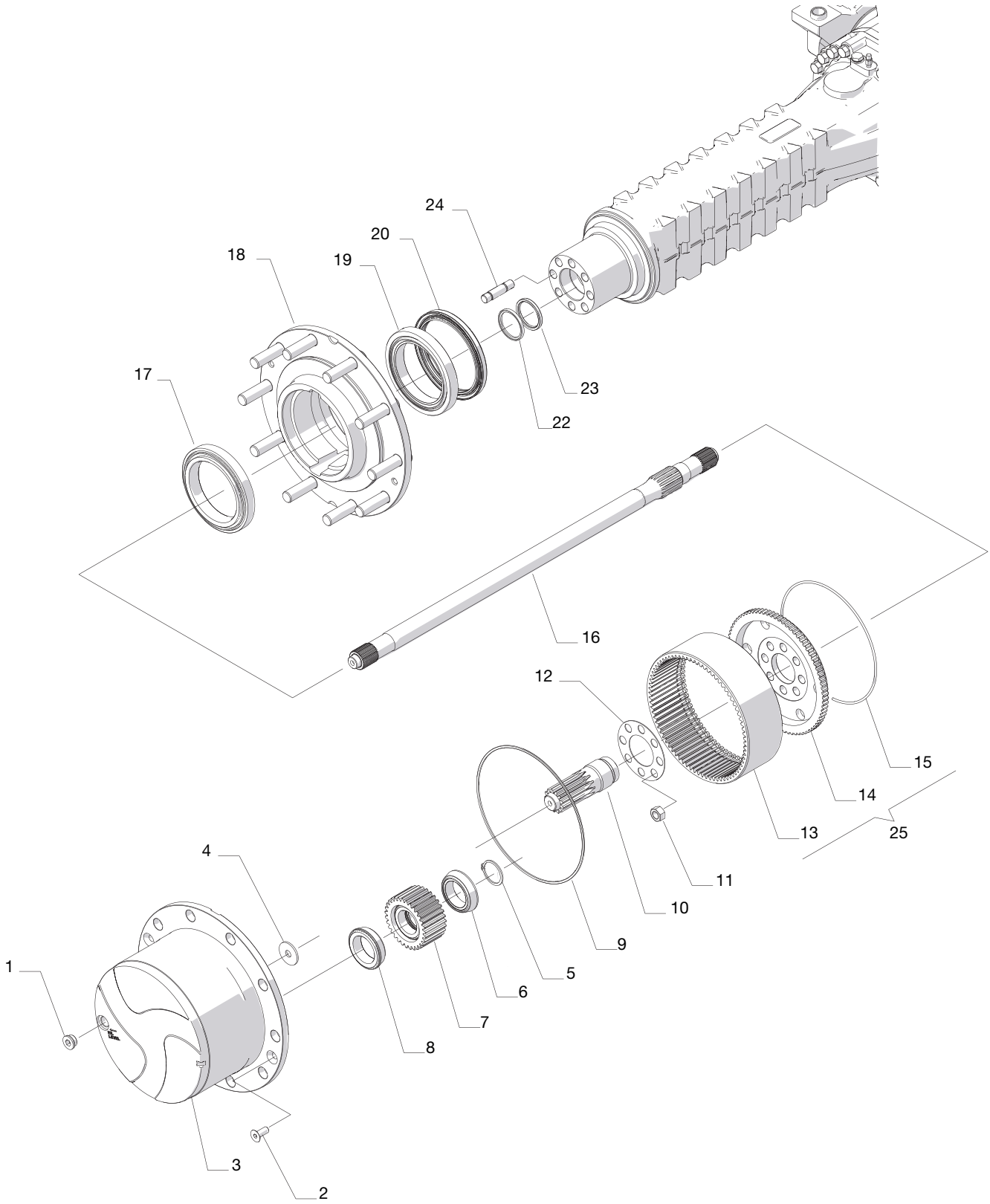
FIGURE 44: Gradually loosen the sleeve and remove.

⚠DANGER

Carefully check that the hydraulic pressure is discharged completely before removing the external pump sleeve connected to the brake.

PLANETARY REDUCTION 6:9

EXPLODED VIEW



DISASSEMBLY

⚠CAUTION

Perform all operations on both arms.

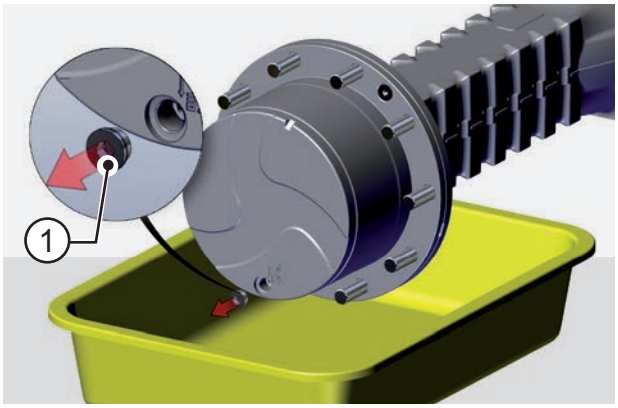


FIGURE 1: Remove the drain plug (1) with washer and drain oil.

⚠CAUTION

Make sure all fluids are contained during inspection, maintenance, tests, adjustment and repair of the product. Prepare a suitable container to collect the fluid before removing any component containing fluids. Dispose of all fluids following legal and local regulations.

⚠WARNING

Hot oil and components can cause personal injury. Avoid skin contact.

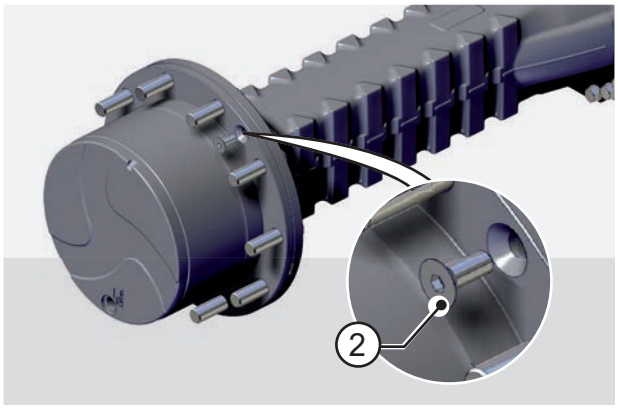


FIGURE 2: Remove planetary cover screws (2).

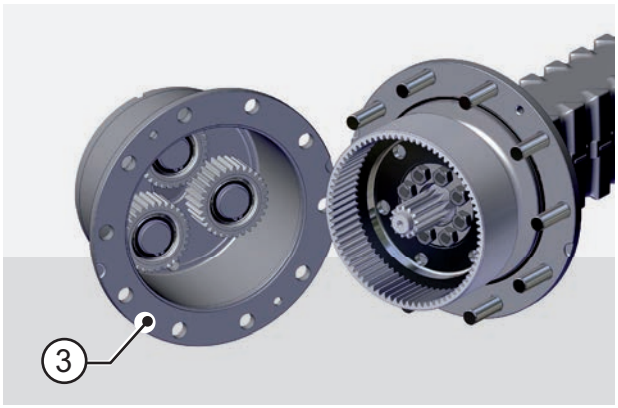


FIGURE 3: Disjoin the planetary cover (3) from the hub by alternatively forcing a screwdriver into the appropriate slots. Remove the complete planetary carrier cover (3).

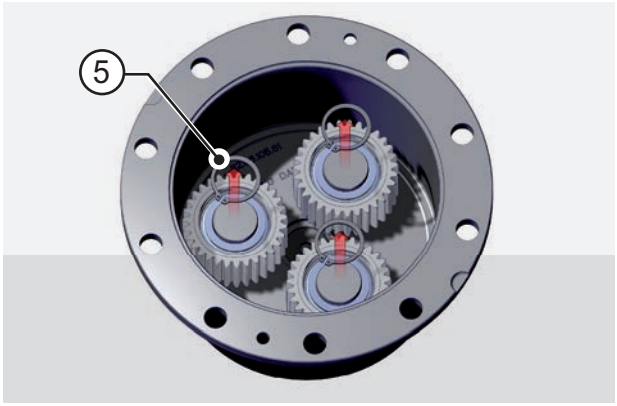


FIGURE 4: Remove snap rings (5).

⚠WARNING

Removal of the snap rings can cause personal injuries. You must wear appropriate safety equipment. To avoid injury to eyes, wear eye protection equipment.

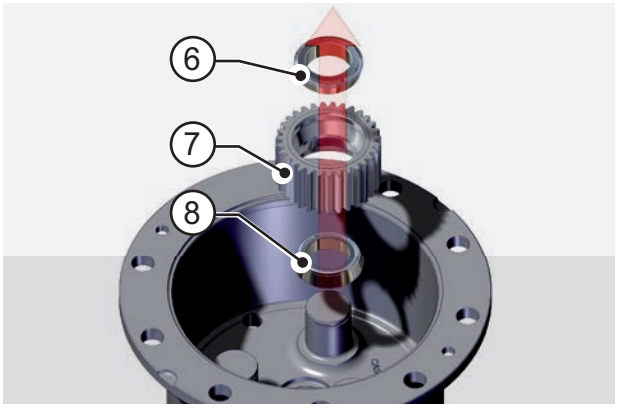


FIGURE 5: Remove the planetary gears (7) and bearings (6, 8).

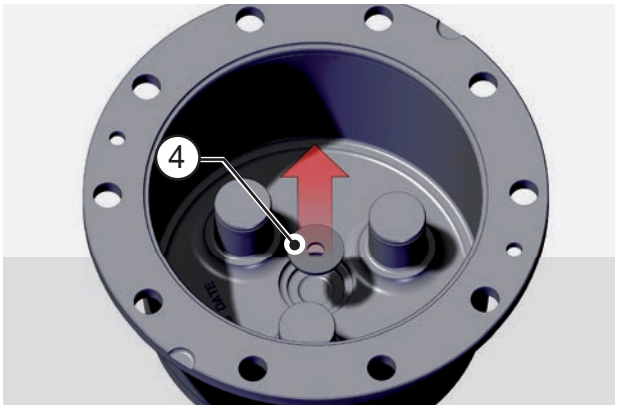


FIGURE 6: Using a puller for inner parts, remove shim washer (4) from planetary cover (3).

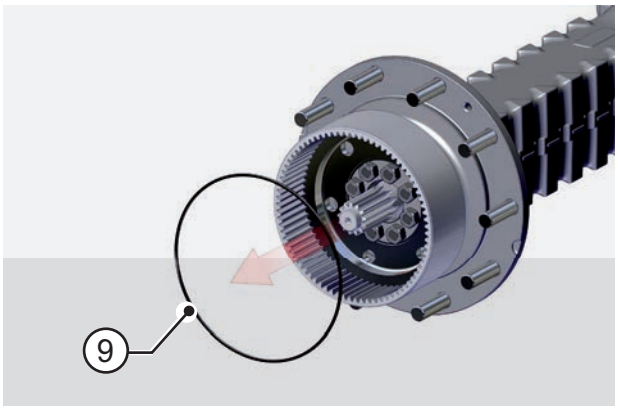


FIGURE 7: Use a screwdriver to remove the o-ring (9).

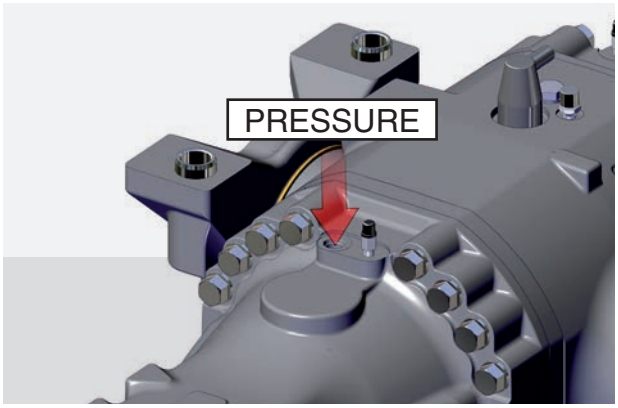


FIGURE 8: Connect a idraulic fitting and apply a adeguate air pressur (6 bar Maximum) actuating the brake to lock the brake discs in position.

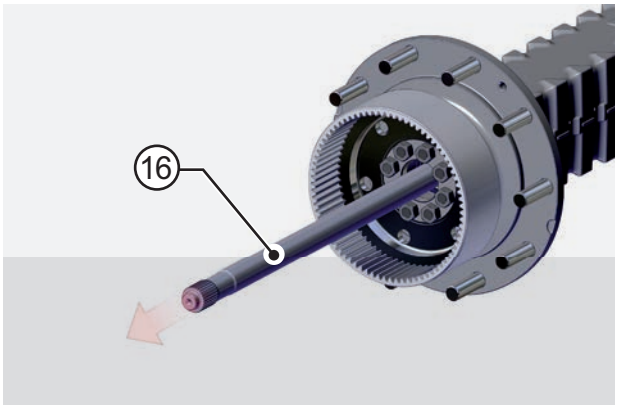


FIGURE 9: Remove the complete axle shaft (16).

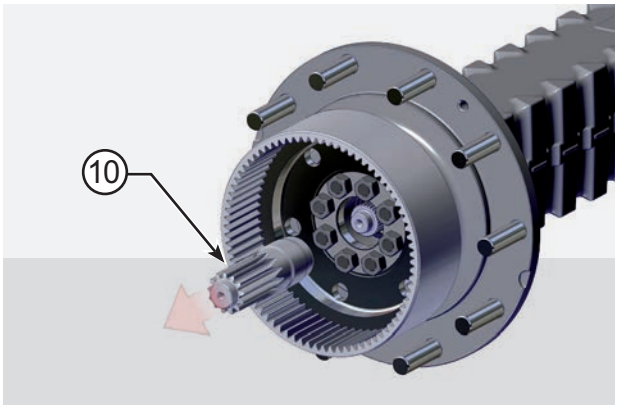


FIGURE 10: Remove the sun gear (10).

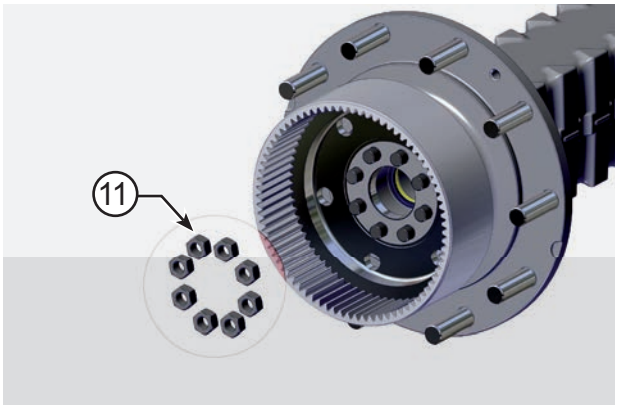


FIGURE 11: Loosen and remove the nuts (11) from the crown flange (25).

NOTE:

If during removal of the nuts (11) the studs (24) got loose, replacement is needed.

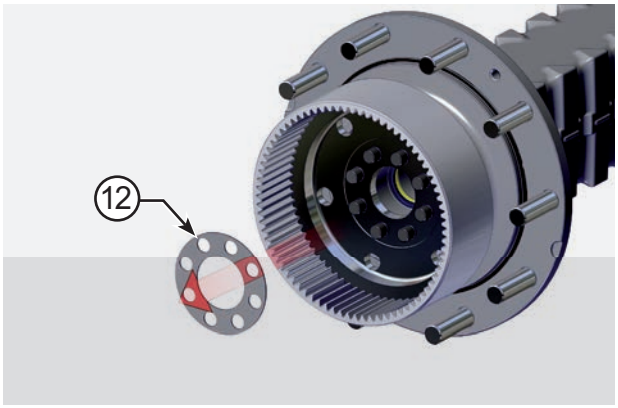


FIGURE 12: Remove the safety flange (12).

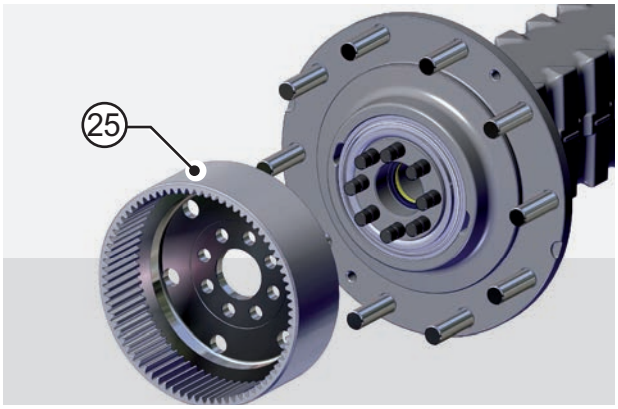


FIGURE 13: Remove the crown flange (25) assembly. Mark the assembly position of the crown gear carrier flange (14).

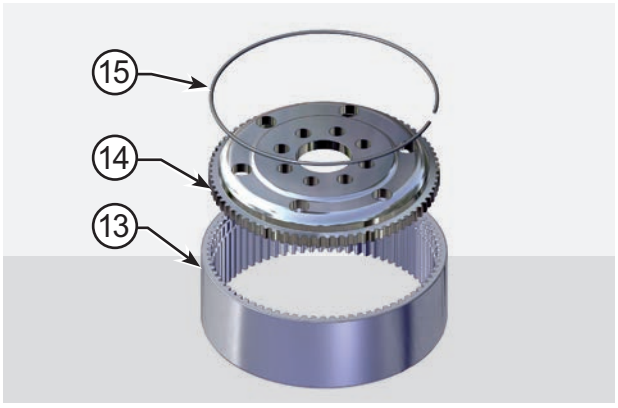


FIGURE 14: Remove the snap ring (15) from the crown (13). Remove the crown flange (14).

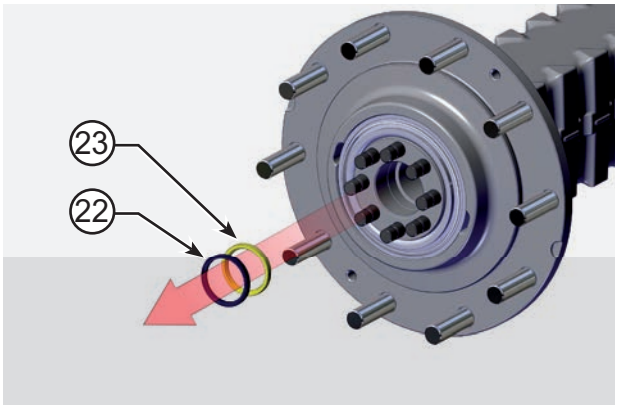


FIGURE 15: Disassemble the sun gear centering ring (22) and seal ring (23) from the arm.

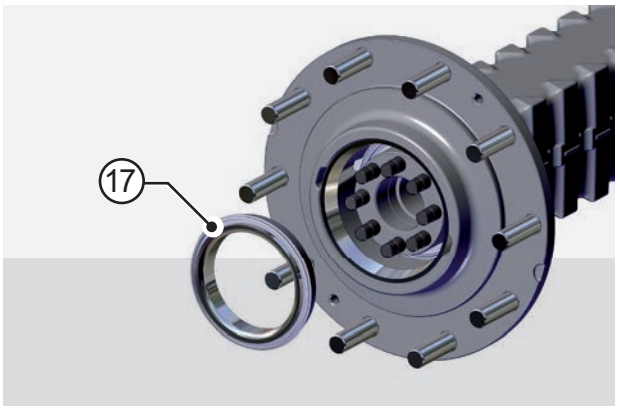


FIGURE 16: Harness the wheel hub (18). Partially extract the hub (18) using an extractor. Remove the external bearing (17).

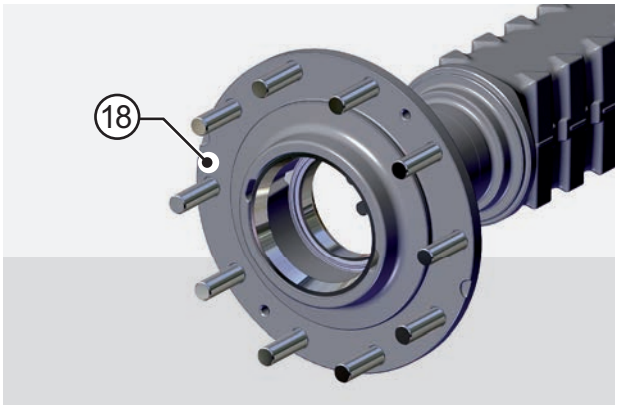


FIGURE 17: Remove the complete hub (18).

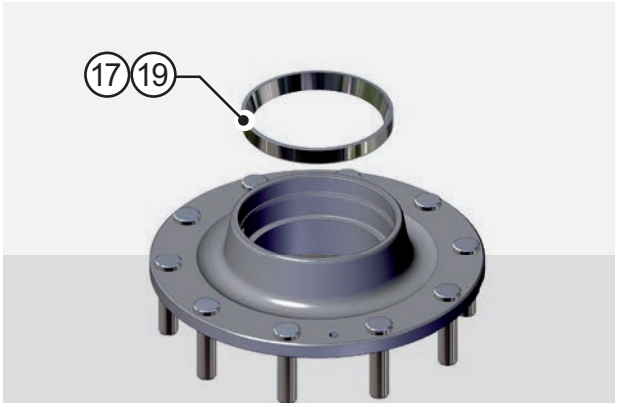


FIGURE 18: Remove the thrust blocks (17, 19) from the bearings by forcing a puller into the appropriate slots on the hub.

NOTE:

Avoid damaging or deforming of the thrust blocks.

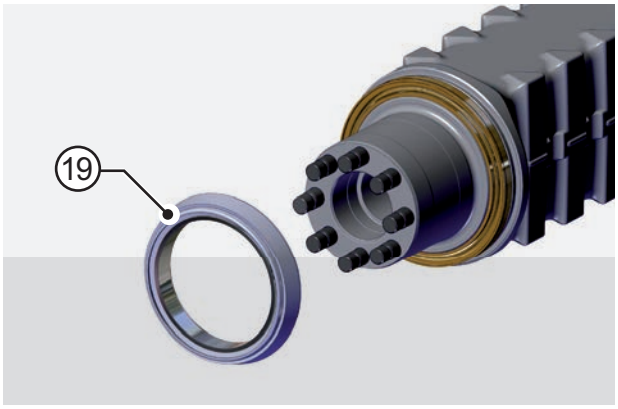


FIGURE 19: Remove the internal bearing (19) from the arm.

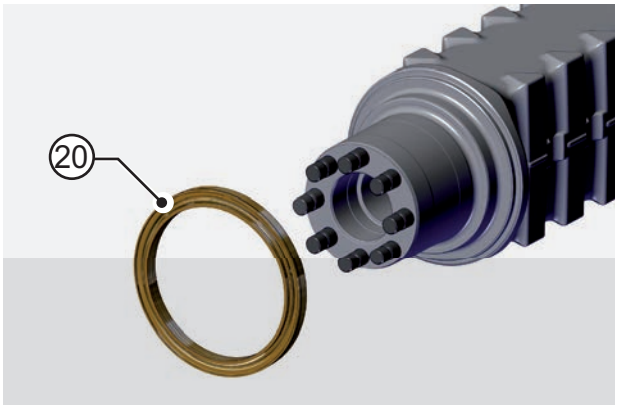


FIGURE 20: Remove snap ring (20) from the arm.

⚠CAUTION

The seal ring may not be reused.

ASSEMBLY

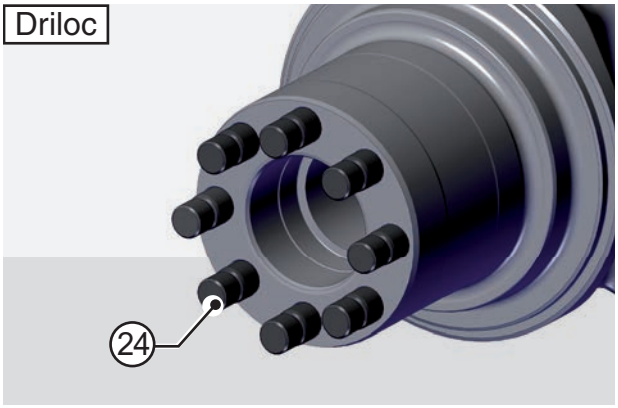


FIGURE 21: Assemble the new studs (24) in the arm and tighten to a torque of 35 - 50 N·m.

NOTE:

Assemble the"Driloc" pretreated stud (24) portion toward the arm.

⚠CAUTION

Use only new studs (24) pretreated with "Driloc" locking adhesive. Threads must be cleaned from oil. Degrease only non pretreated threads.

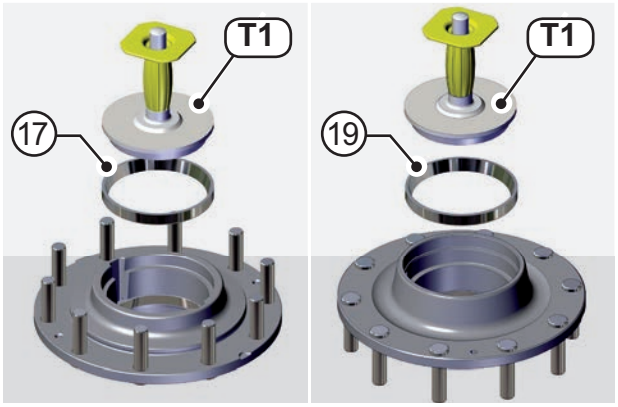


FIGURE 22: Position the upper part of tool T1 (See drawing T1 p. 170) and press the thrust blocks (17, 19) into the hub (18) at end of stroke.

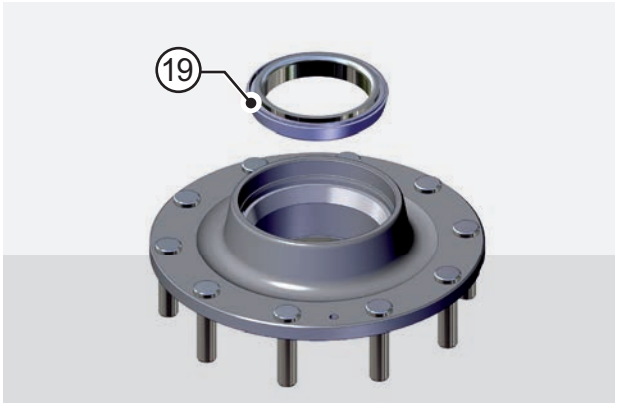


FIGURE 23: Assemble the inner tapered roller bearing (19) in the hub (18).

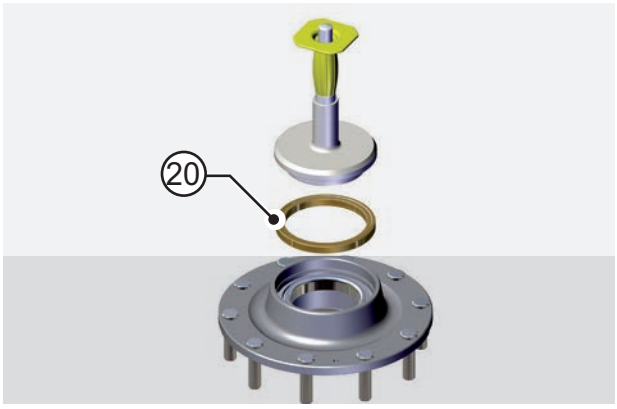


FIGURE 24: Position the sealing ring (20) in the special tool T2 (See drawing T2 p. 171).
Position tool T2 (See drawing T2 p. 171) and press the sealing ring (20) into its seat.

NOTE:

Ensure the ring (20) is correctly oriented. The flat surface should be visible after mounting.

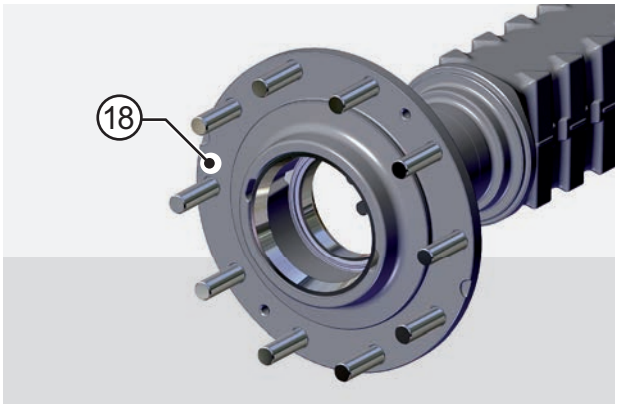


FIGURE 25: Install the wheel hub (18).

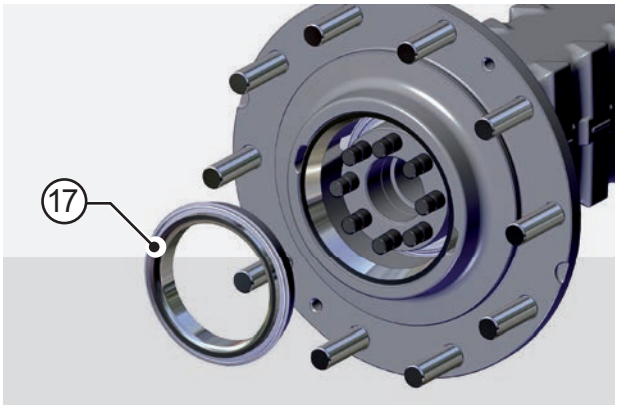


FIGURE 26: Install the inner bearing (17).

NOTE:

Using a plastic hammer, drive the bearing to the limit stop by lightly hammering around the edge.

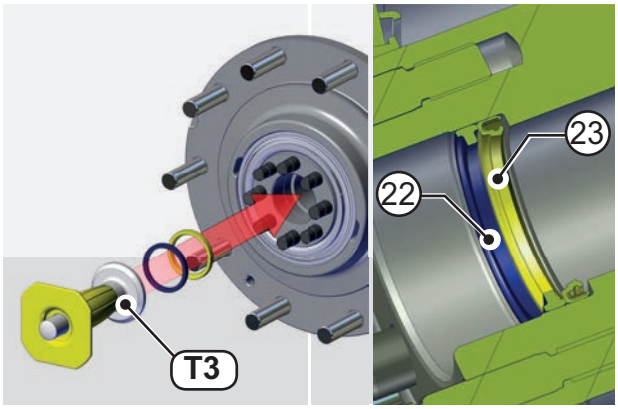


FIGURE 27: Assemble centering ring on the special tool T3 (see drawing T3 p. 172) , lubricate the seal ring lips (23) and assemble on the special tool T3, then assemble them in the arm.

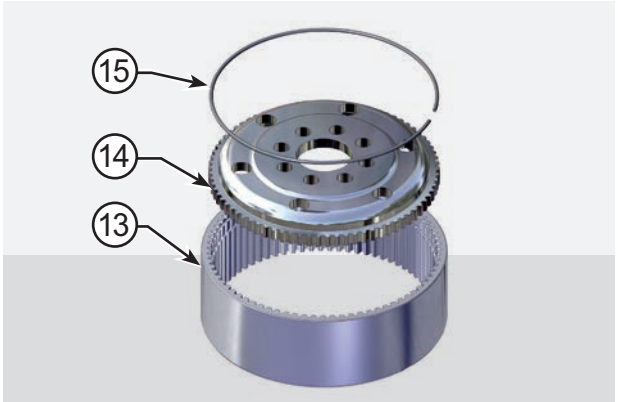


FIGURE 28: Install the crown flange (14) to the crown wheel (13) and lock in position with the snap ring (15).

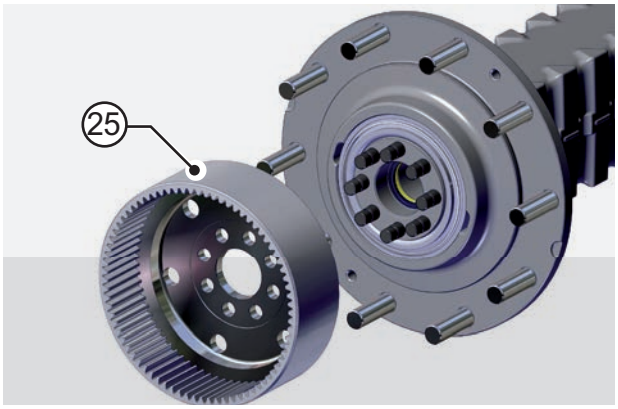


FIGURE 29: Install the complete crown flange (25) assembly. In order to fasten the flange (25), use a plastic hammer and alternately hammer on several equidistant points.

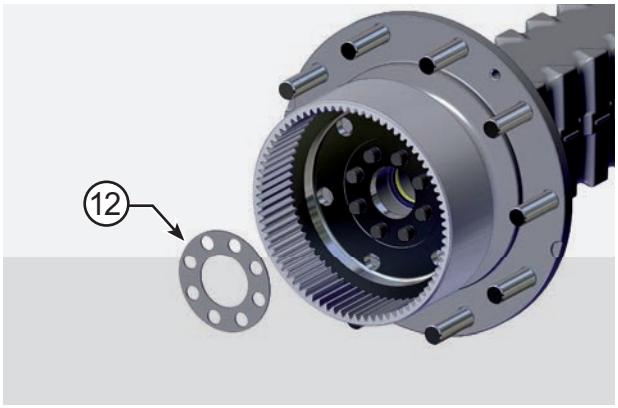


FIGURE 30: Install the safety flange (12).

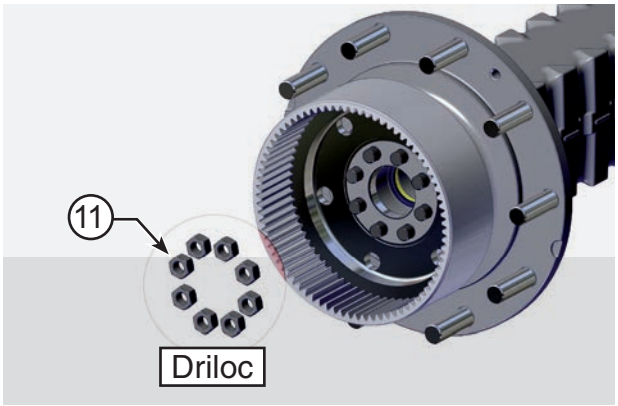


FIGURE 31: Tighten the nuts (11) in two stages, using the criss-cross method.
Final torque wrench setting: 255 - 285 N·m.

⚠CAUTION

Use only new nuts pre-treated with Driloc locking adhesive. Threads must be cleaned from oil. Degrease only non pre-treated threads.

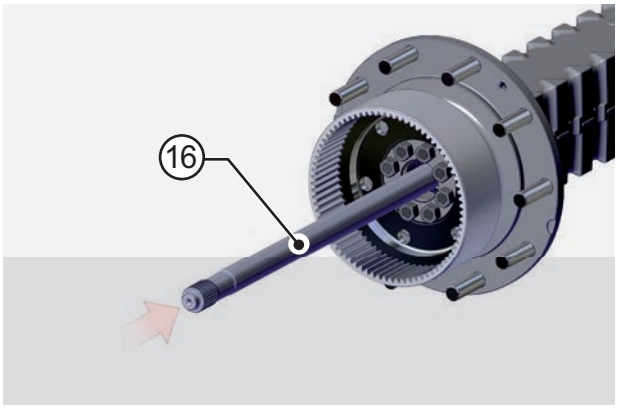


FIGURE 32: Grease seal ring (23) and sealing face of axle-shaft (16).
Install the axle shaft (16) making sure it is properly engaged in the braking disks and in the differential unit.

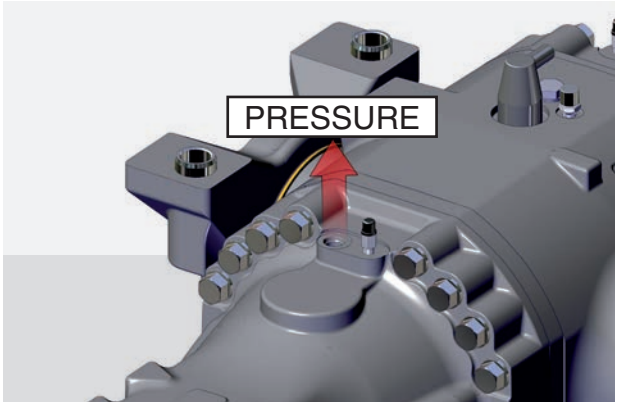


FIGURE 33: Gradually release the pressure and remove the idraulic fitting.

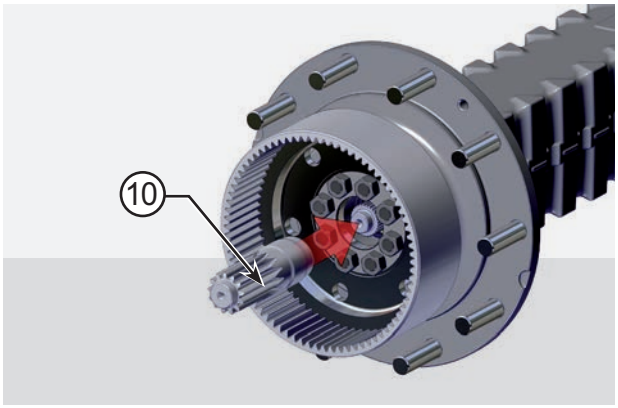


FIGURE 34: Install the sun gear (10).

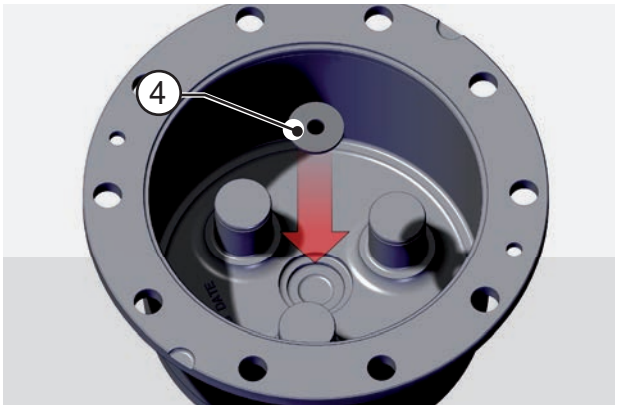


FIGURE 35: Using tool T4 (See drawing T4 p. 173), fit shim washer (4) into planetary cover (3).

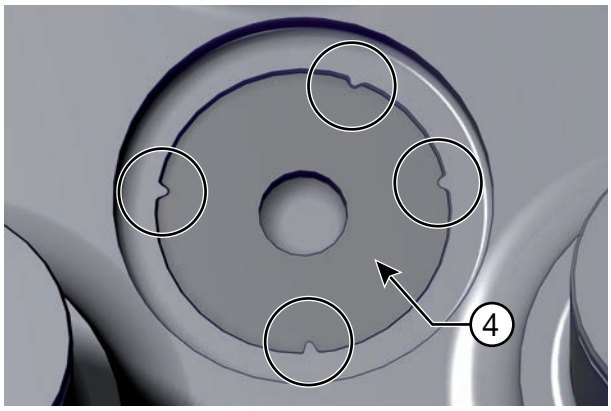


FIGURE 36: Using a caking tool, calk the edge of the shim washer (4) seat as shown in picture.

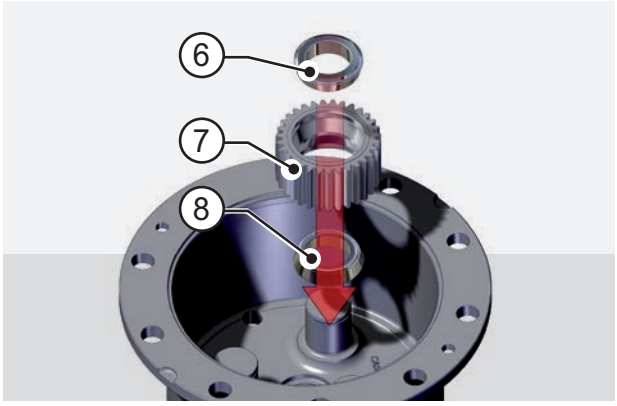


FIGURE 37: With the help of a driver, insert the first bearing (8) into the cover (3).
Fit the planetary gear (7) onto the satellite gear cover (3), and insert the second bearing (6) using a driver.

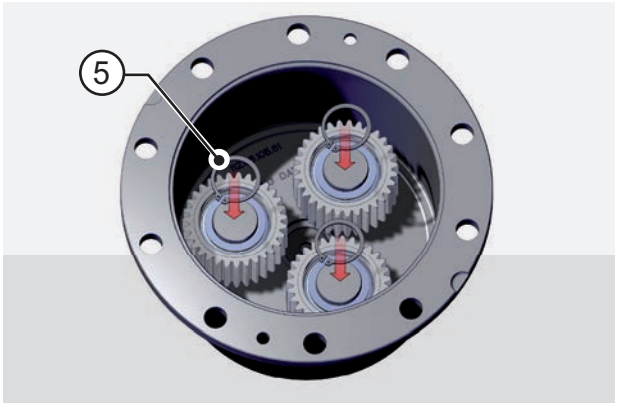


FIGURE 38: Lock into position the planetary gears (7) with the snap rings (5).
Pay attention to the correct snap ring (5) assembling.

⚠CAUTION

Install the snap rings (5) with the worked side facing the bearings.

⚠WARNING

Personal injury can result when installing snap ring.

The appropriate safety equipment must be worn.

To avoid injury to your eyes, wear protective glasses during this procedure.

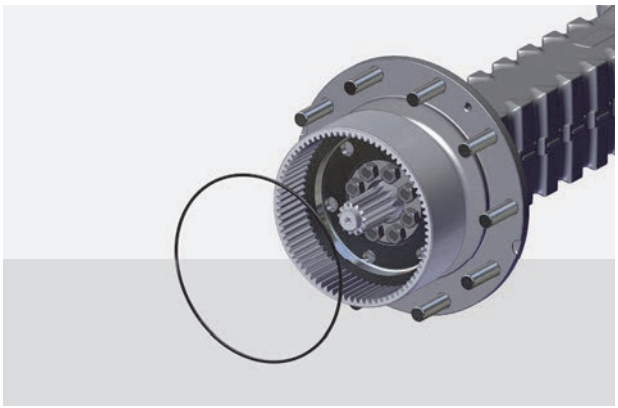


FIGURE 39: Insert a new o-ring (9) on the centering diameter of wheel hub.

NOTE:

In order to hold the o-ring (9) in position, apply grease to it.

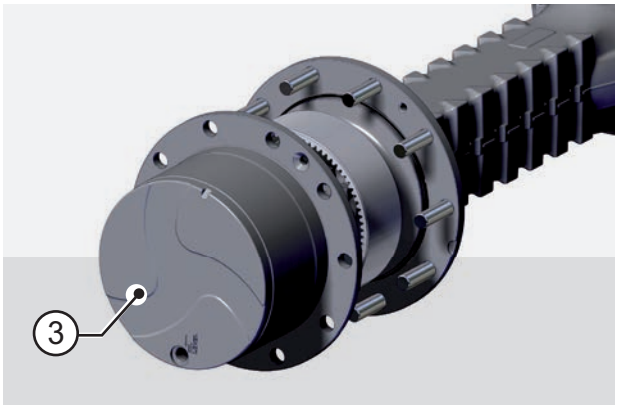


FIGURE 40: Fit the planetary carrier cover (3) onto the hub (18).

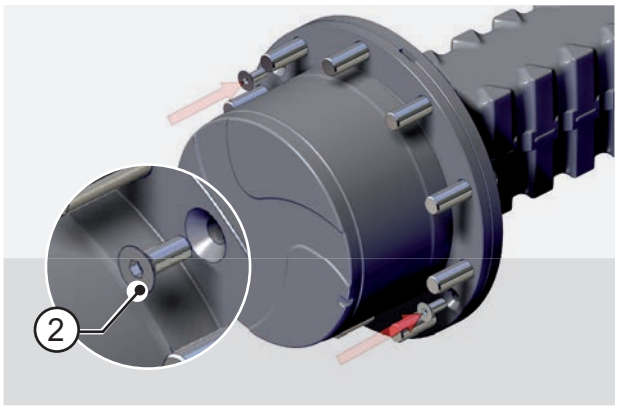


FIGURE 41: Lock the planetary carrier cover (3) by tightening the screws (2).
Torque wrench setting for screws: 35 - 50 N·m.

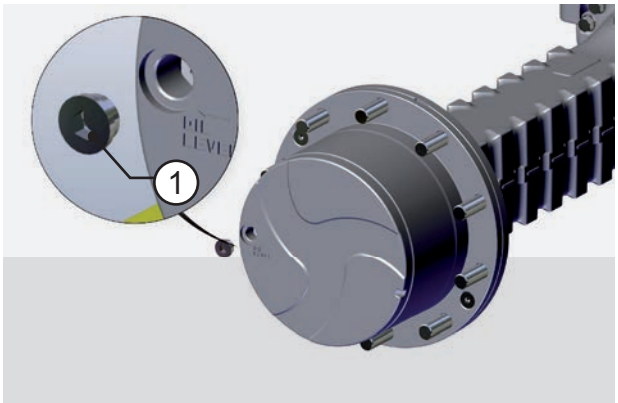
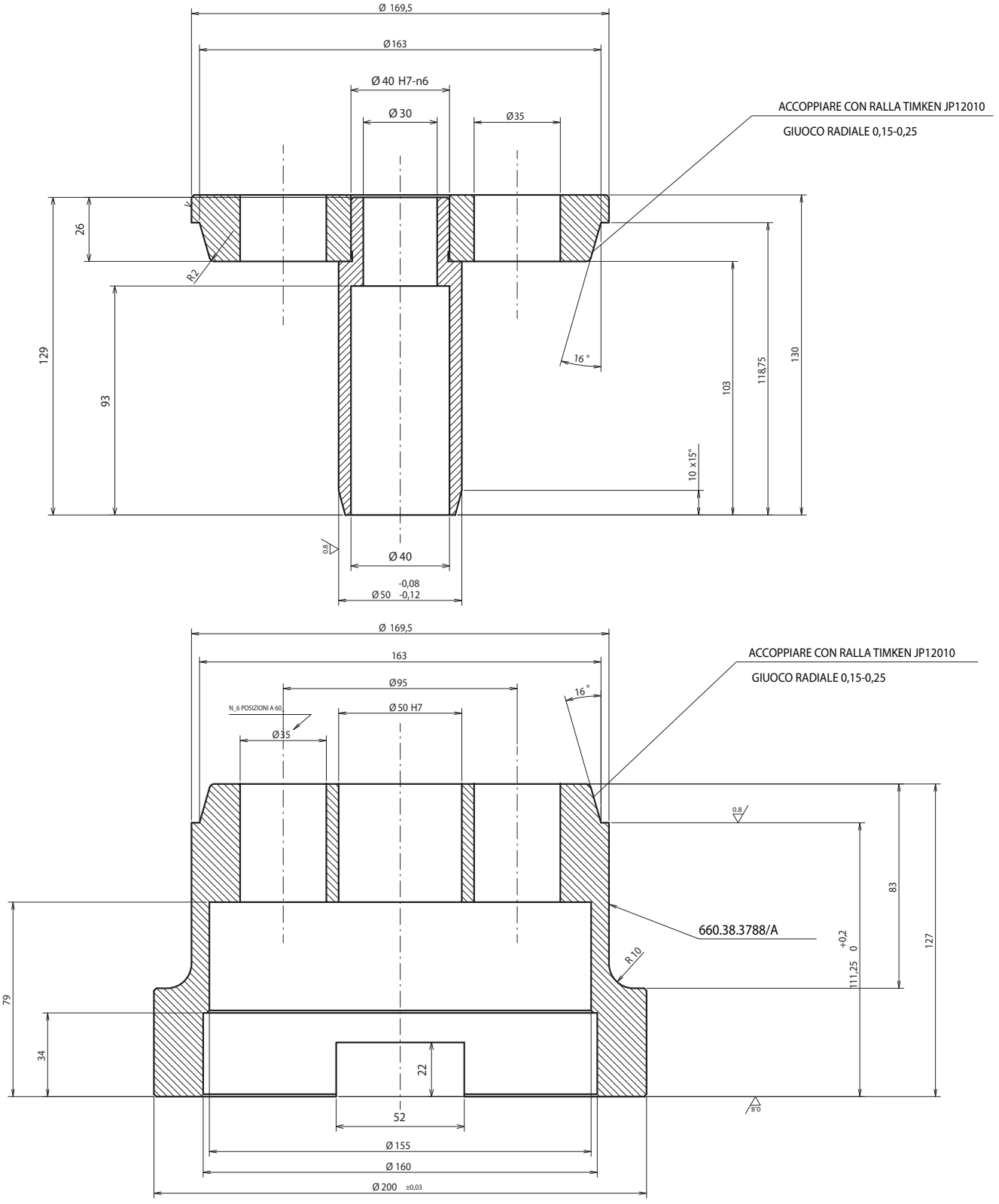


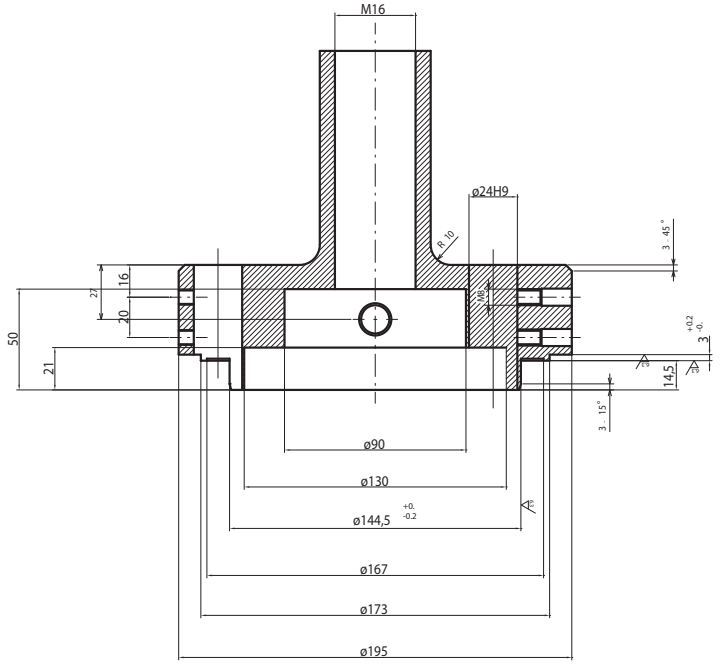
FIGURE 42: Install the oil filling plug (1) and washer.
Torque wrench setting: 35 - 50 N·m.
Fill with appropriate type and quantity of oil.

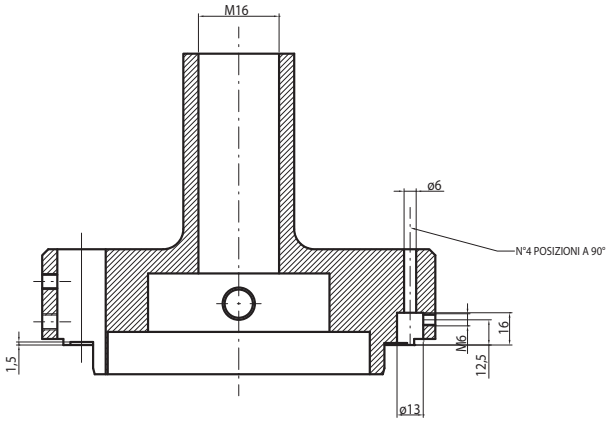
SPECIAL TOOLS

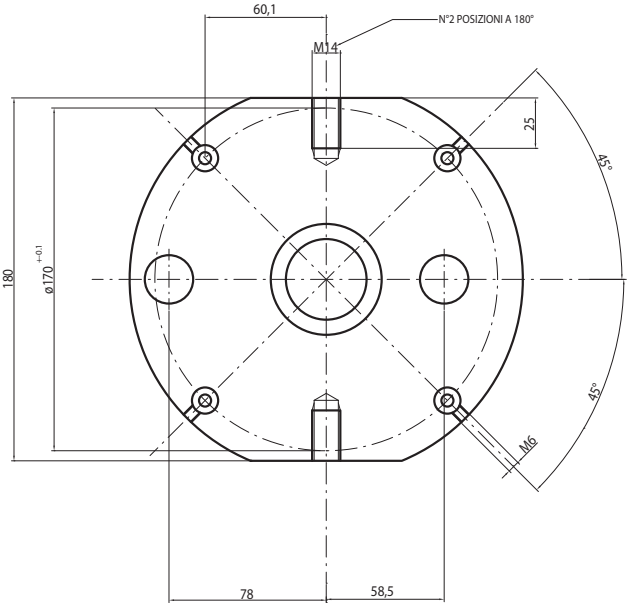
T1



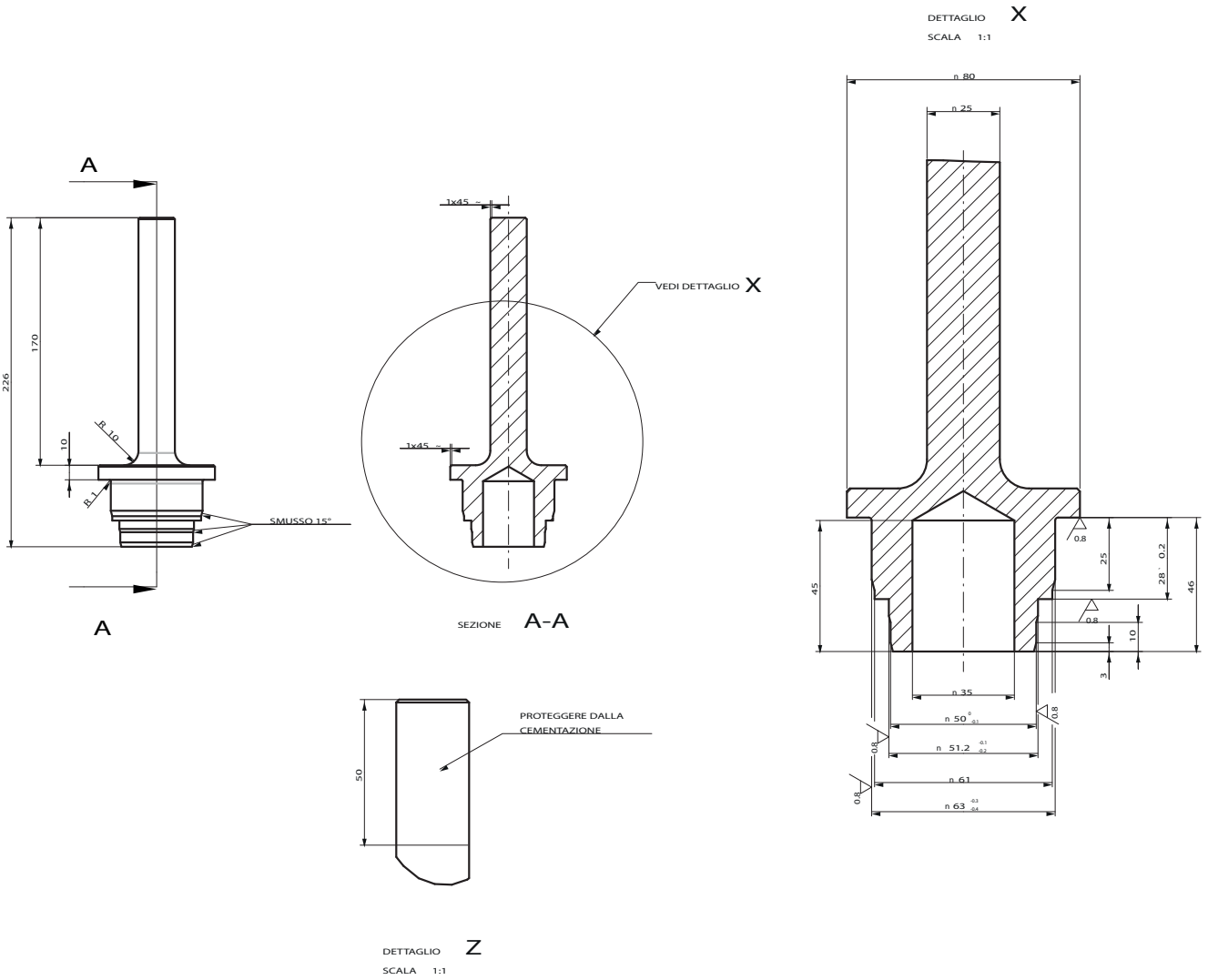
T2


M16
ø24H9
R 10
3 -45°
16
22
20
M8
50
21
3
14,5
3 -15°
ø90
ø130
ø144,5
ø167
ø173
ø195

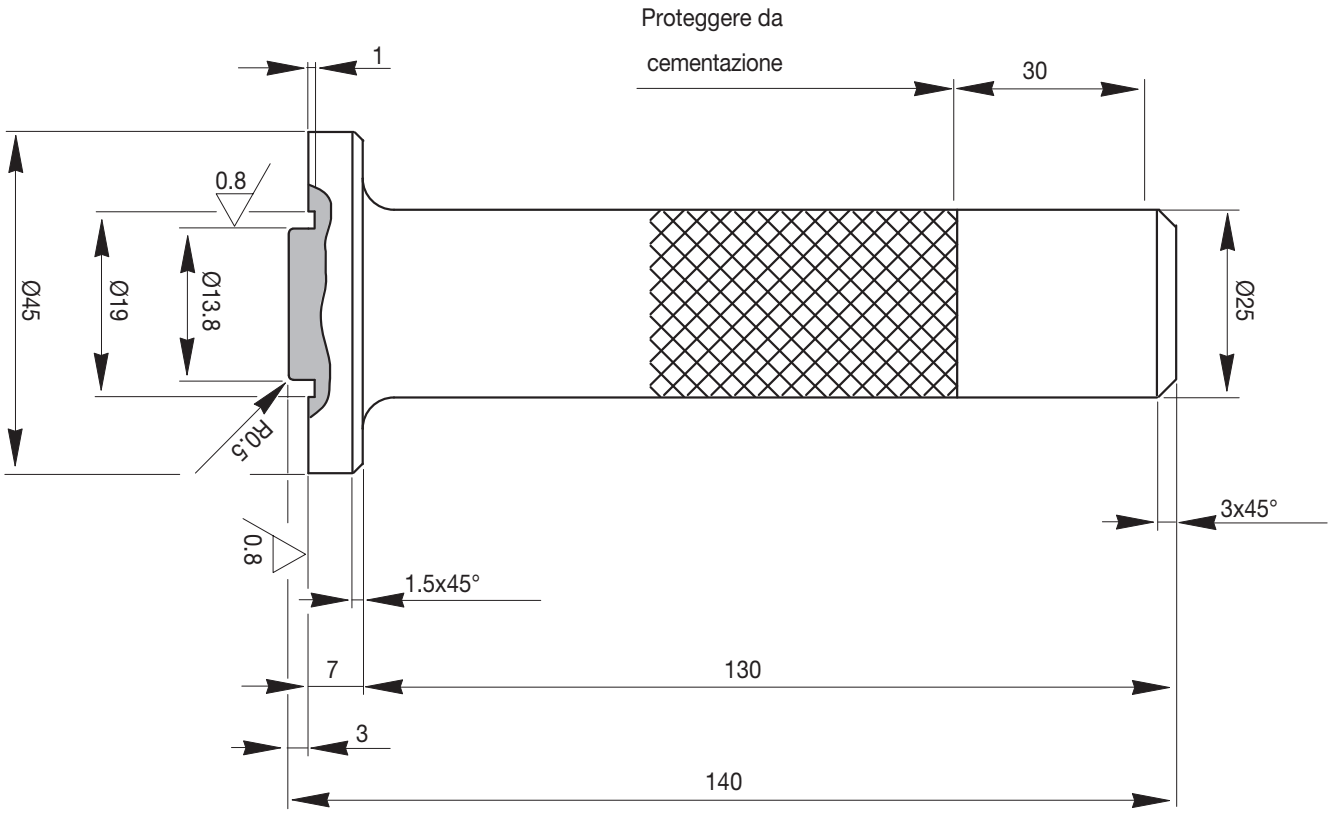

M16
ø6
N°4 POSIZIONI A 90°
1,5
M6
16
12,5
ø13


60,1
N°2 POSIZIONI A 180°
M14
25
45°
180
ø170
45°
M6
78
58,5

T3

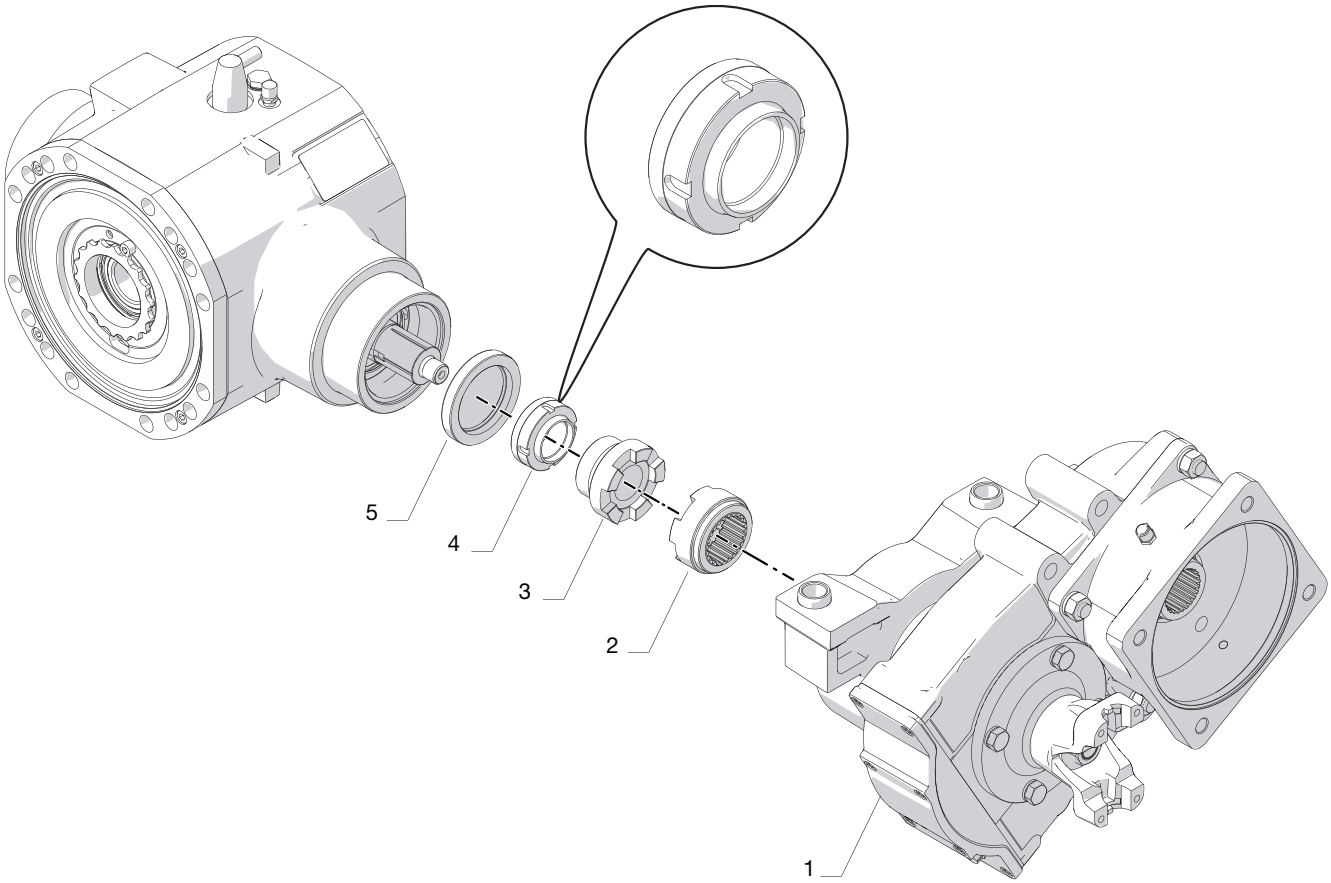

A
226
170
10
R 10
R 1
SMUSSO 15°
A
1x45
VEDI DETTAGLIO X
1x45
SEZIONE A-A
DETTAGLIO X
SCALA 1:1
n 80
n 25
45
0.8
25
28
0.2
46
10
3
n 35
n 50
n 51.2
n 61
n 63
PROTEGGERE DALLA CEMENTAZIONE
50
DETTAGLIO Z
SCALA 1:1

T4


Proteggere da
cementazione
1
30
0.8
Ø45
Ø19
Ø13.8
Ø25
R0.5
3x45°
0.8
1.5x45°
7
130
3
140

FLANGED PINION TO GEARBOX WITH FLOATING FLANGE

EXPLODED VIEW



DISASSEMBLY

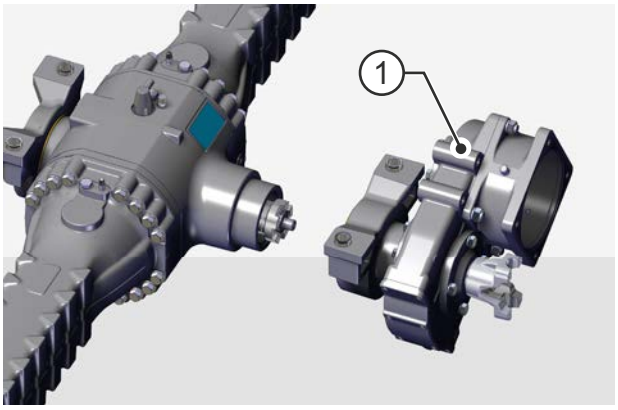
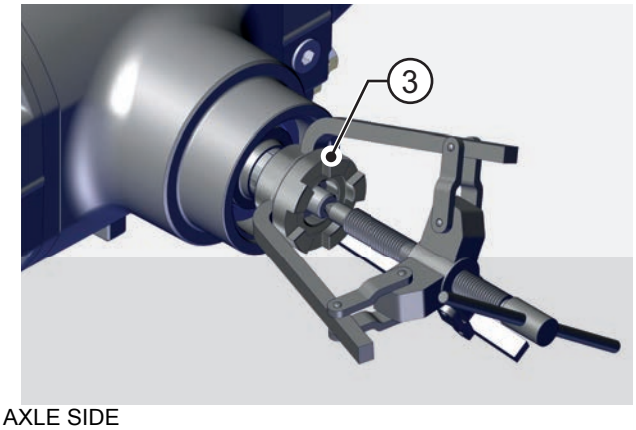


FIGURE 1: Disjoin the entire reduction unit (1) from the axle and place it on a bench.



AXLE SIDE

FIGURE 2: Using an extractor, disassemble the floating slange sleeve (3), if the removal result difficult using an air heater, heat up the floating flange sleeve (3) to a maximum temperature of 100°C, and remove.

⚠WARNING

Wear protective garments when handling hot objects.

NOTE:

Carefully clean the shaft splines from Loctite residue.

⚠CAUTION

Check the shaft splines do not have wear signs.

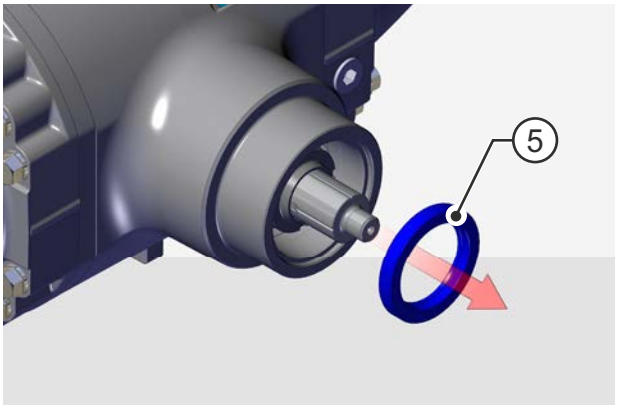


FIGURE 3: Remove the sealing ring (5).

FIGURE 4: Position wrench T1 (See drawing T1 p. 179) onto the ring nut (4) and apply bar hold T2 (See drawing T2 p. 180) to the pinion.
Stop wrench T1 (See drawing T1 p. 179) and rotate the pinion so as to release and remove the ring nut (4).

⚠CAUTION

Before to disassemble the ring nut is needed to remove the caulks.

NOTE:

If the pinion, the bearings or other parts must be replaced, refer to the chapter BEVEL PINION p. 37.

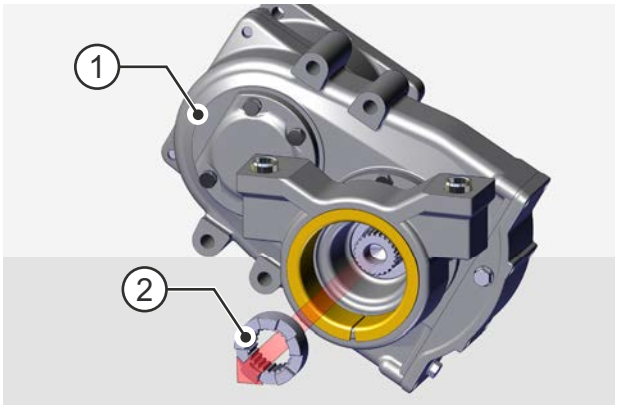


FIGURE 1: GEARBOX SIDE
Remove the floating flange sleeve (1) from gearbox output shaft.

NOTE:

If disassembly proves awkward, heat the ring nut to approximately 80°C.

⚠CAUTION

Check the shaft splines do not have wear signs.

NOTE:

Carefully clean the shaft splines from grease residue.

ASSEMBLY

NOTE:

ONLY IF PREVIOUSLY DISASSEMBLED

If the pinion, the bearings or other components must be installed and adjusted, refer to the procedure.

FIGURE 2: Apply Loctite 270 to the thread of the ring nut (4) and screw the nut onto the pinion.
Apply special wrench T1 (See drawing T1 p. 179) to the ring nut (7) and bar-hold T2 (See drawing T2 p. 180) to the pinion (8).
Lock the wrench T1 (See drawing T1 p. 179) and rotate the pinion using a torque wrench, up to a minimum required torque setting of 900-1000 N·m.

⚠CAUTION

Using a calking tool, calk the ring gear collar in the provided holes paying attention to do not cut the collar.

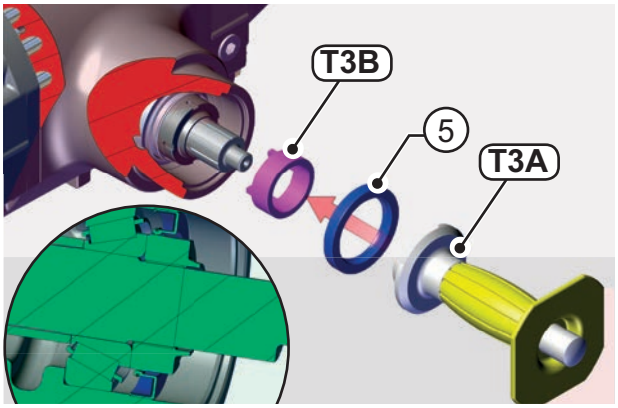


FIGURE 3: Assemble the centering tool T3B (see drawing T3B p. 182) on the ring nut (4), lubricate the sealing ring (4) inner lip and assemble it on the special tool T3A (see drawing T3A p. 181). Install in its seat.

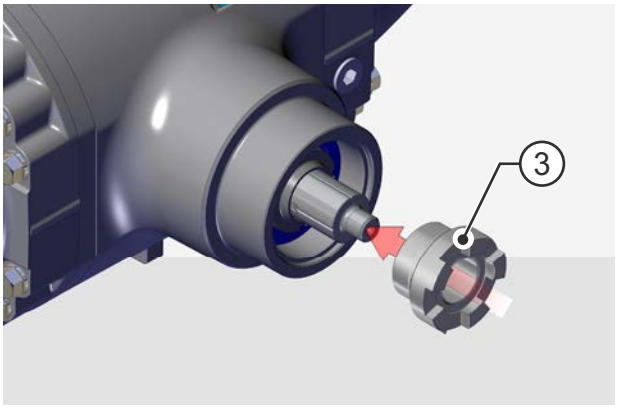


FIGURE 4: AXLE SIDE
As shown in the picture, using Loctite 648, coat the inner splines of the sleeve (3) and the pinion spline.
Assemble the floating flange sleeve onto the pinion.

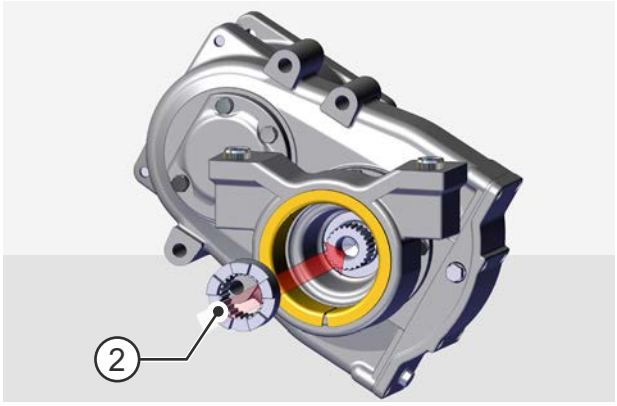


FIGURE 5: GEARBOX SIDE
Using specific grease EP_NLG 2 or 3, carefuly coat the output shaft splines. Assemble the floating flange sleeve (2) onto the gearbox output shaft.

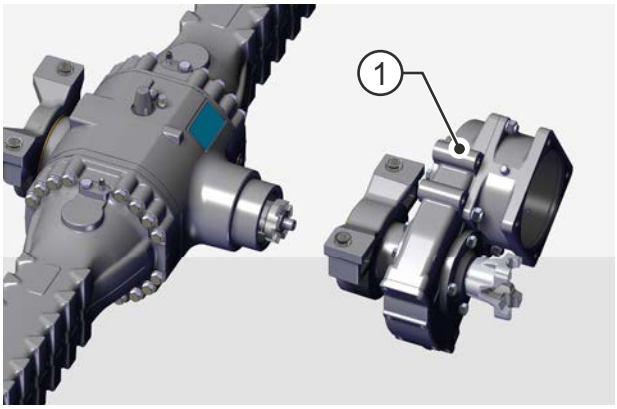


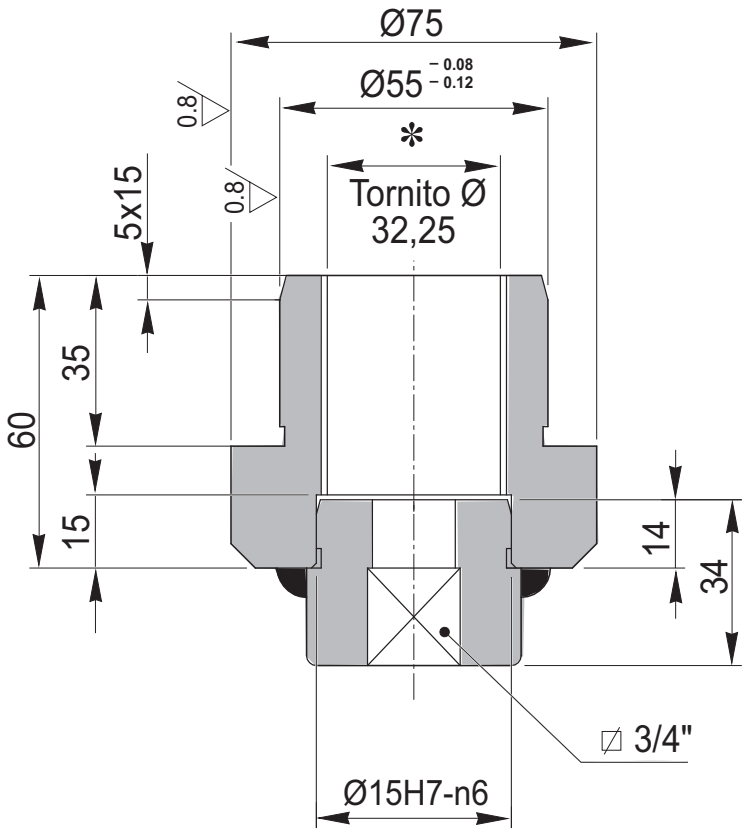
FIGURE 6: The reduction unit was attached to a sling during dismantling.
Install the entire reduction unit.

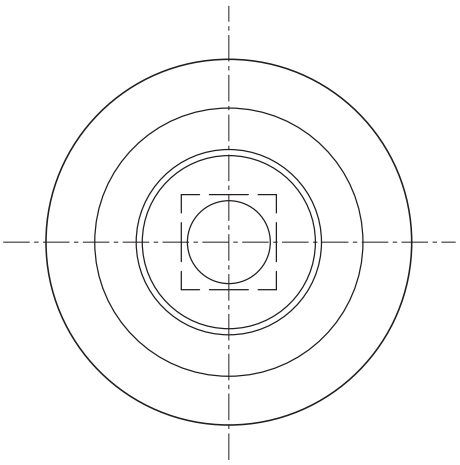
SPECIAL TOOLS

T1

P/N: 3317/3

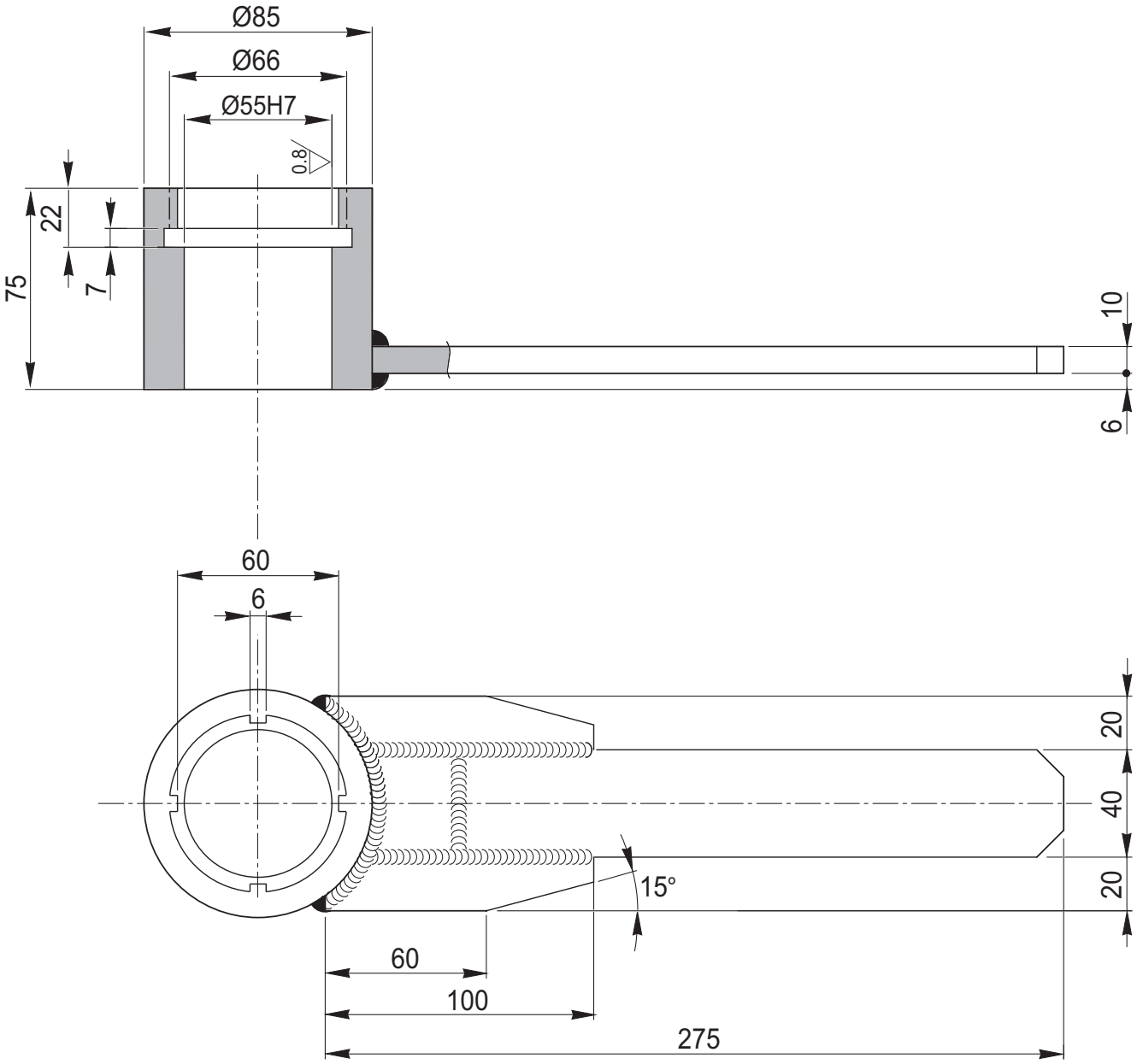
✻38x1.25x29 DIN 5480



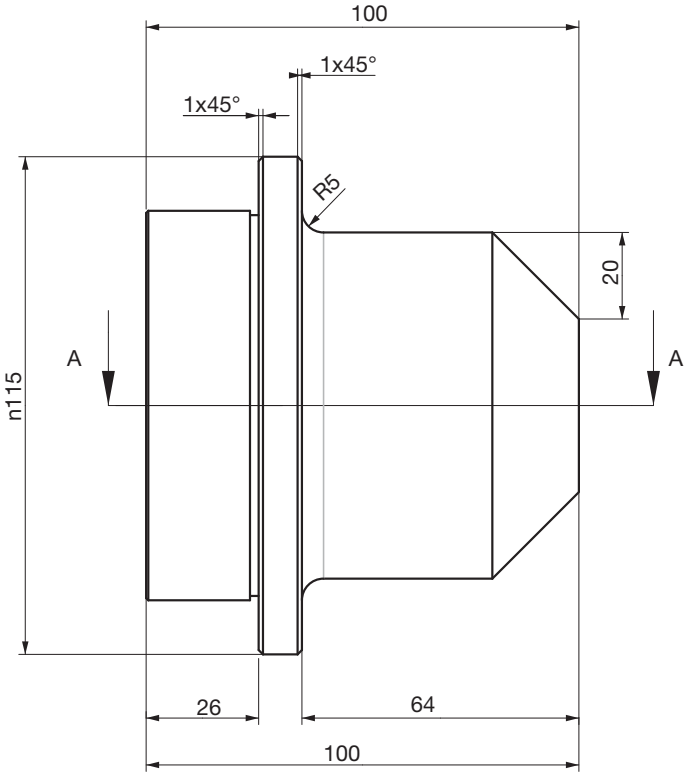


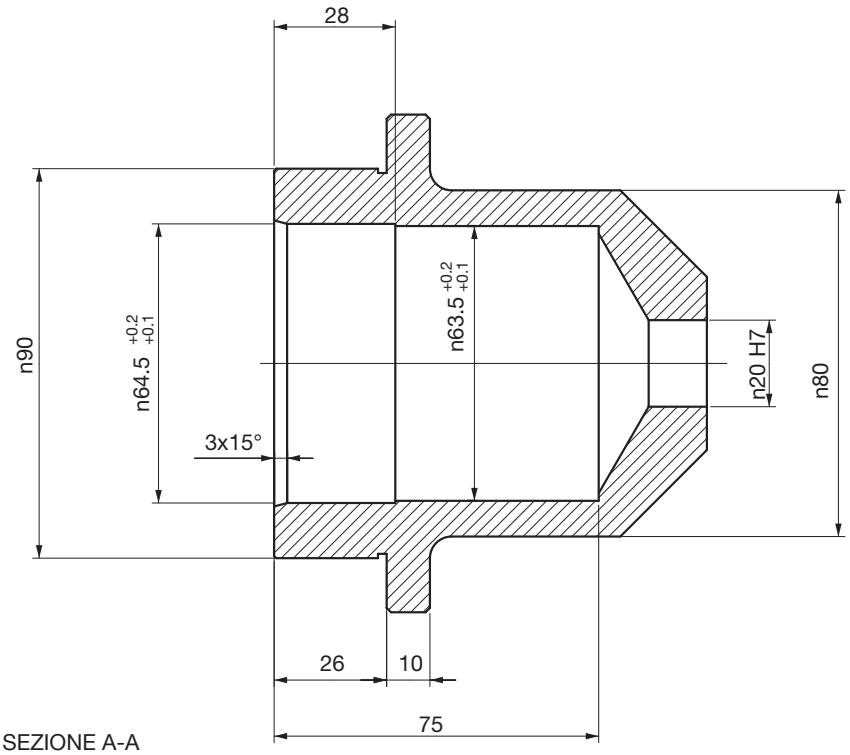
T2

P/N: 3317/A



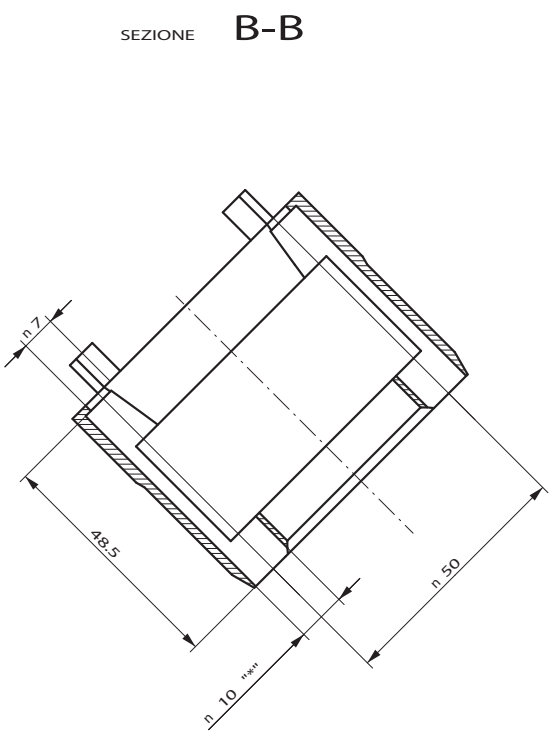
T3A

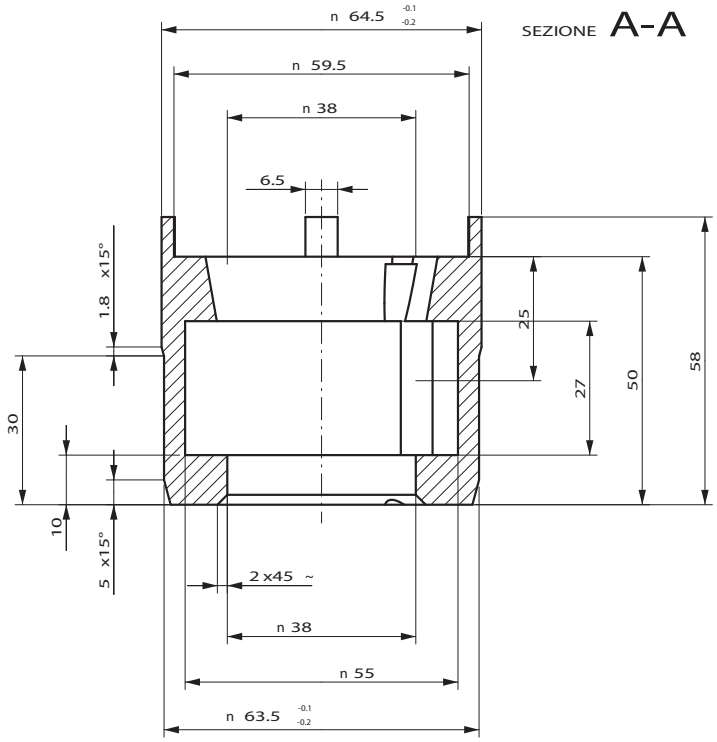




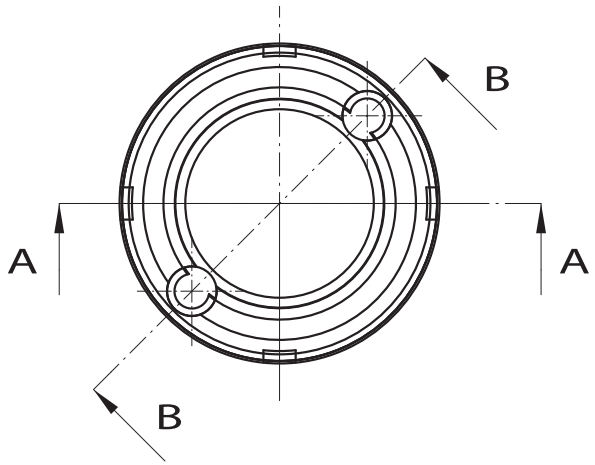
SEZIONE A-A

T3B



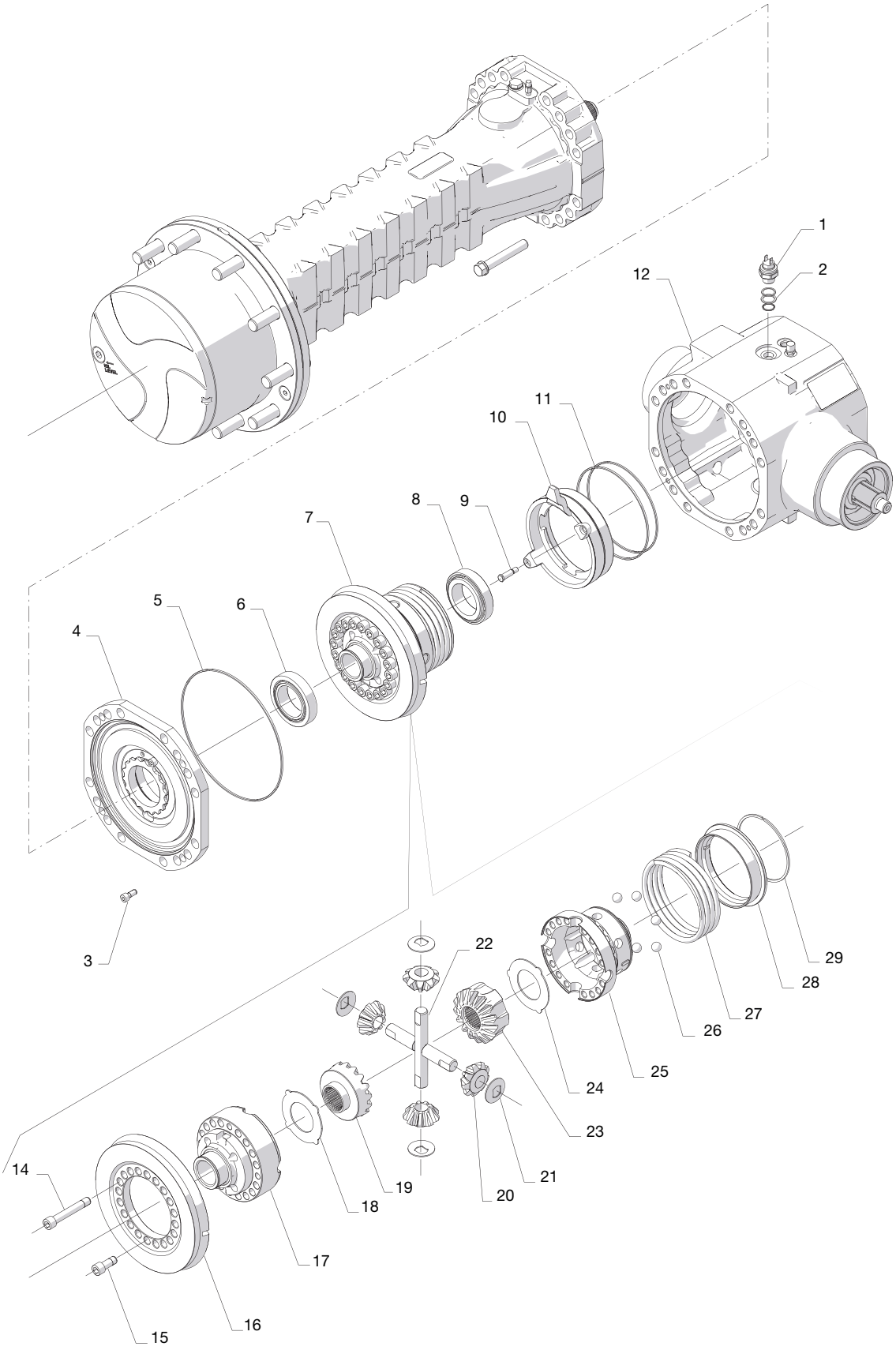


"*" da adattare al magnete utilizzato



DIFFERENTIAL WITH BLOCK TO SPHERES 100%

EXPLODED VIEW



DISASSEMBLY

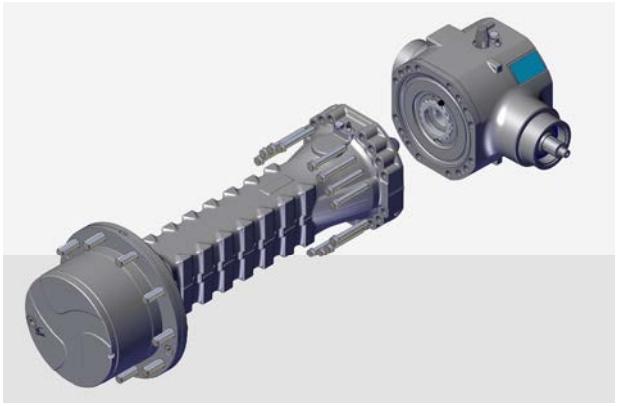


FIGURE 1: Remove the complete arms.
For details, see CHECKING WEAR AND REPLACING THE BRAKING DISCS p. 19.

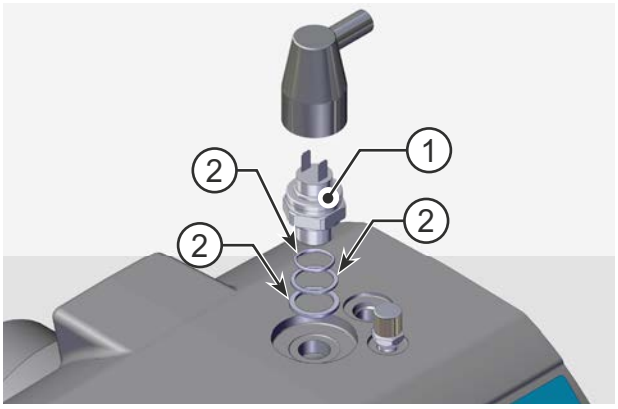


FIGURE 2: Remove the security switch (1).

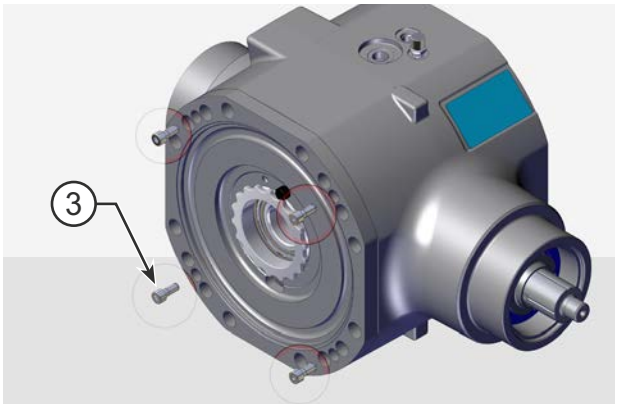


FIGURE 3: Remove the capscrews (3) from the middle cover (4).

NOTE:

Check the state of the o-ring (5).

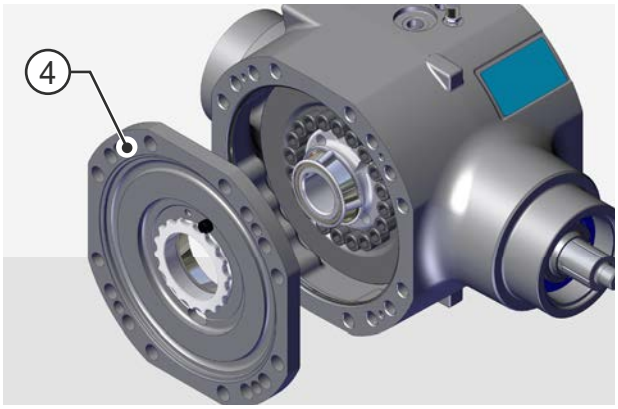


FIGURE 4: Insert a screwdriver in the opposing slots then force and remove the middle cover (4) and the complete differential unit.

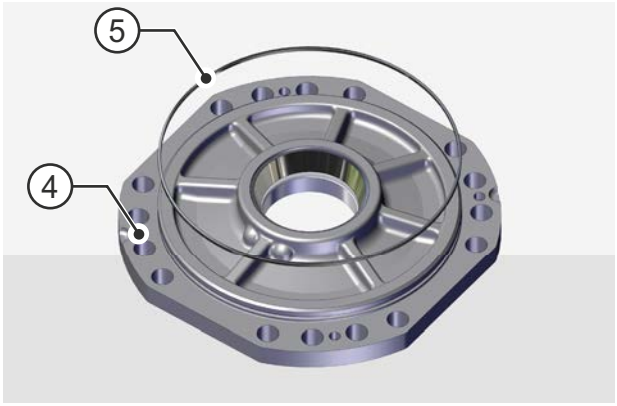


FIGURE 5: Use a screwdriver to remove the o-ring (5).

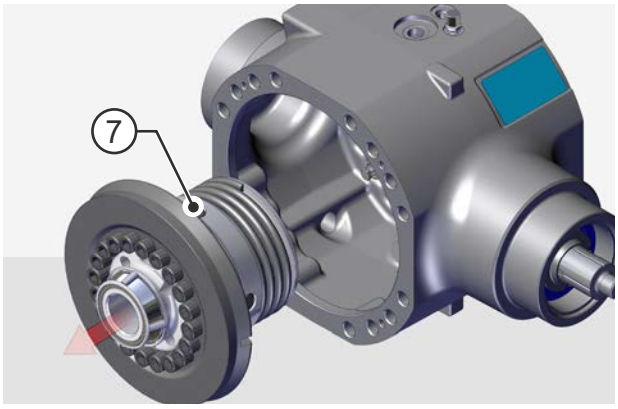


FIGURE 6: Extract the complete differential unit (7).

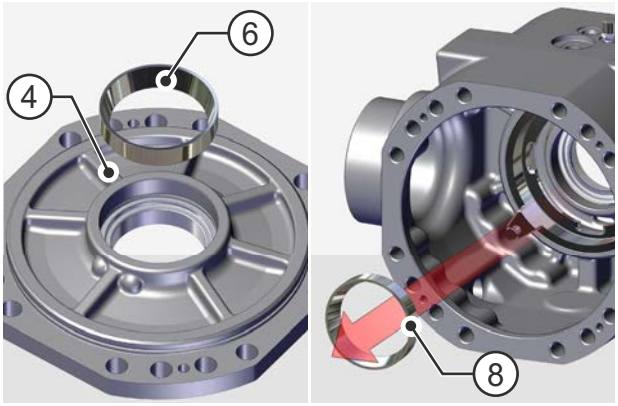


FIGURE 7: If the bearings (6, 8) need replacing, extract the external thrust blocks of the bearings (6, 8) from middle cover (4) and central housing (12).

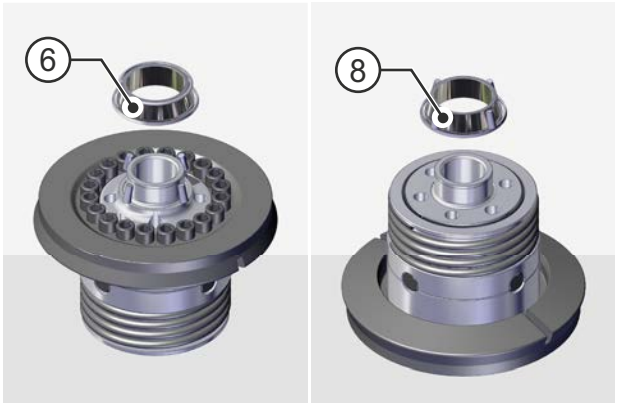


FIGURE 8: If the bearing needs replacing, extract the bearings (6, 8) from the differential carrier (17, 25).

⚠CAUTION

If disassembly is carried out in order to replace crown wheel and pinion, bearings, or planetary gear, break up distance washers and calculate clearances as indicated in the sections regarding removal, disassembly, assembly and installation of differential unit and bevel pinion.

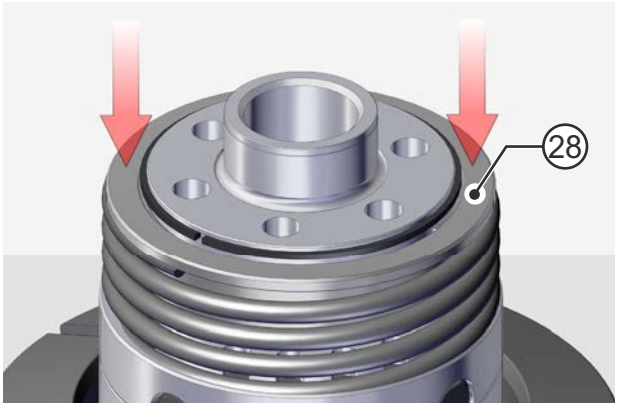


FIGURE 9: Using a press, load the spring (27) and the swivel sleeve (28).

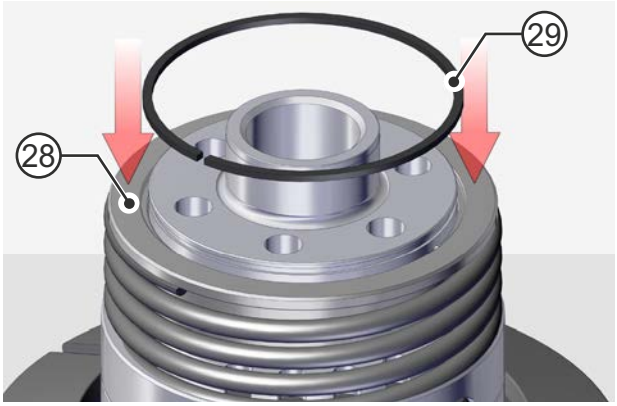


FIGURE 10: Pull off the coupling (28) and the spring (27).

⚠WARNING

Removal of the snap rings can cause personal injuries. You must wear appropriate safety equipment. To avoid injury to eyes, wear eye protection equipment.

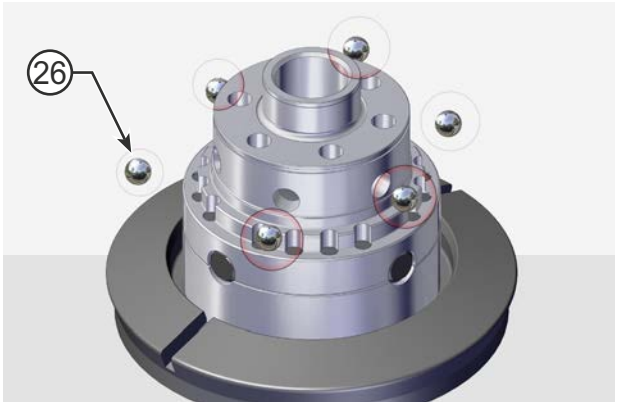


FIGURE 11: Remove the blocking balls (26).

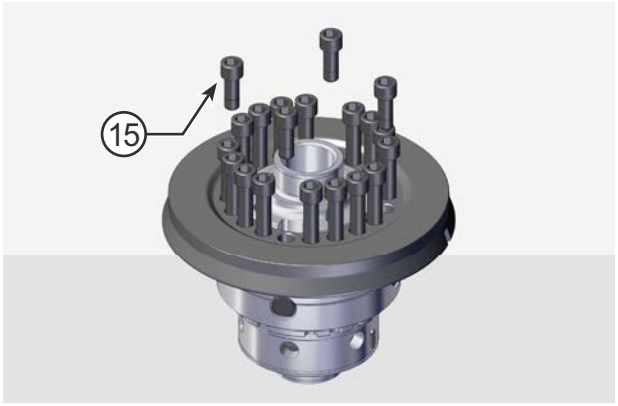


FIGURE 12: Remove the fittin screws (14, 15) of the crown (16).
Note the position of assembly.

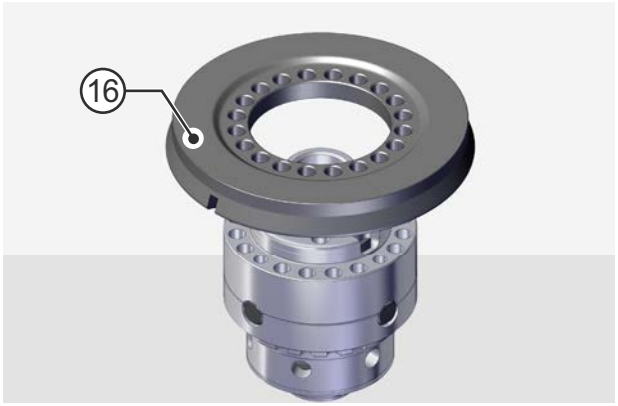


FIGURE 13: With the help of a punch, remove the crown (16).

FIGURE 14: Using a plastic hammer, disjoin the half box (17, 25).

NOTE:

Note the coupling marks.

FIGURE 15: Remove the shim washer (18) and the planetary gear (19).

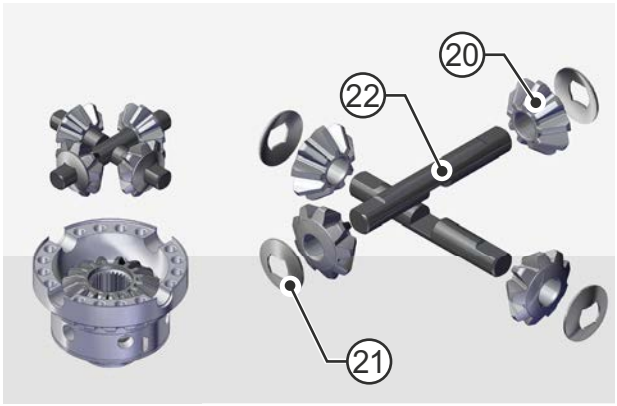


FIGURE 16: Remove shafts (22), complete with satellite gears (20) and spherical shoulder washers (21).

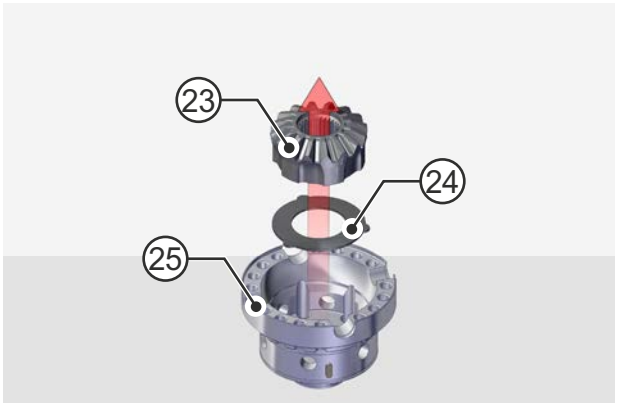


FIGURE 17: Remove the shim washer (24) and the planetary gear (23).

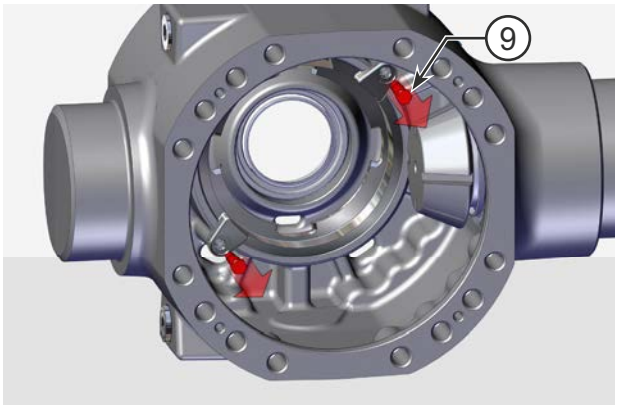


FIGURE 18: Remove the piston guide screws (9).

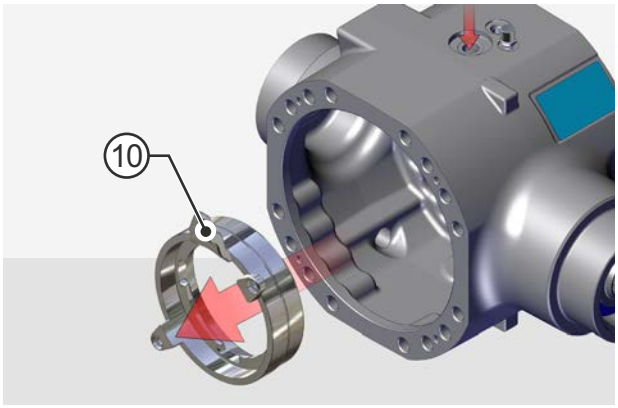


FIGURE 19: Slowly introduce compressed air via the differential lock inlet to extract the piston (10).

⚠DANGER

Work carefully as the piston may be expelled rapidly.

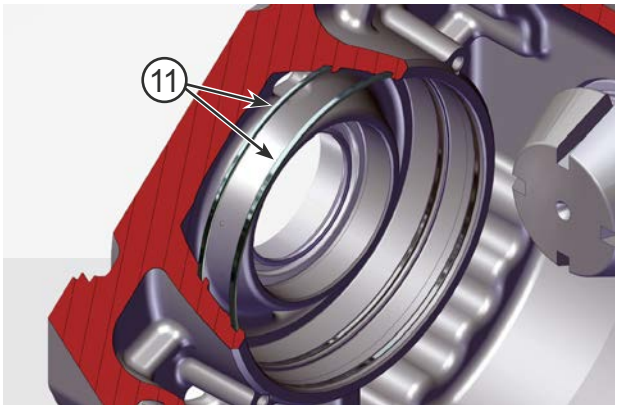


FIGURE 20: Remove all seals (11) from the arm.

NOTE:

All seals must be replaced every time the unit is disassembled.

Particular attention must be paid not to damage the seats of both seals and piston slide.

ASSEMBLY

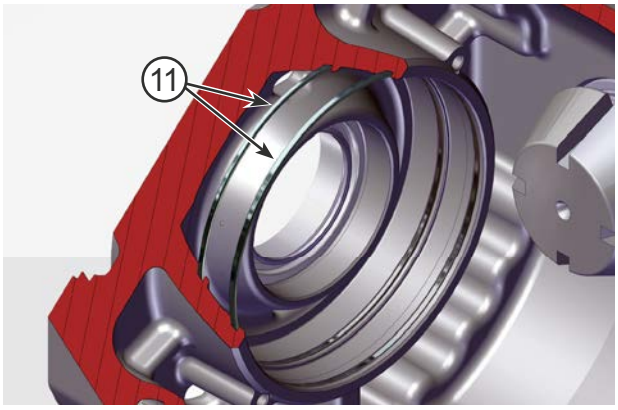


FIGURE 21: Install new piston o-rings (11) in the central housing. Lubricate the o-rings (11) before fitting.

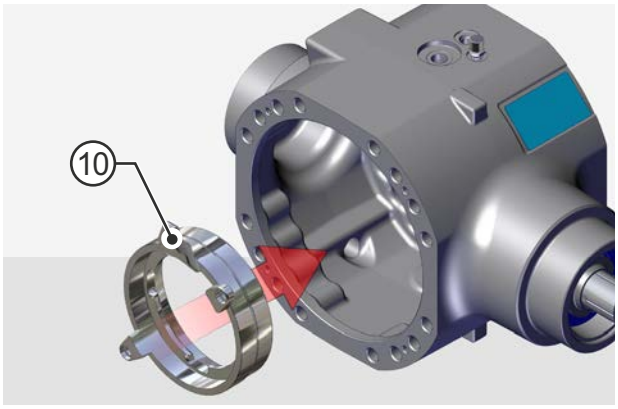


FIGURE 22: Install the piston (10) assembly.
Tap lightly with a mallet to seat the piston (10) completely.

NOTE:

Note the assembly position.

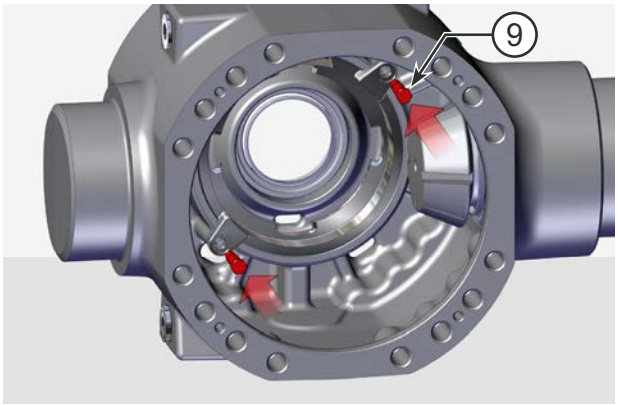


FIGURE 23: Apply Loctite 270 to the threaded portion of the guide screws (10).
Torque wrench setting: 14 - 16 N·m.

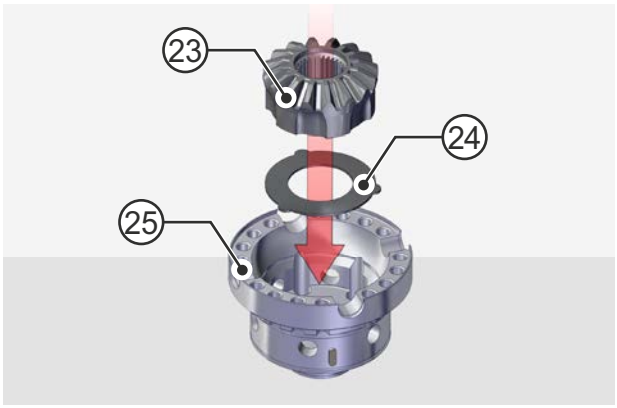


FIGURE 24: Insert planetary gear (23) together with shim washer (24).

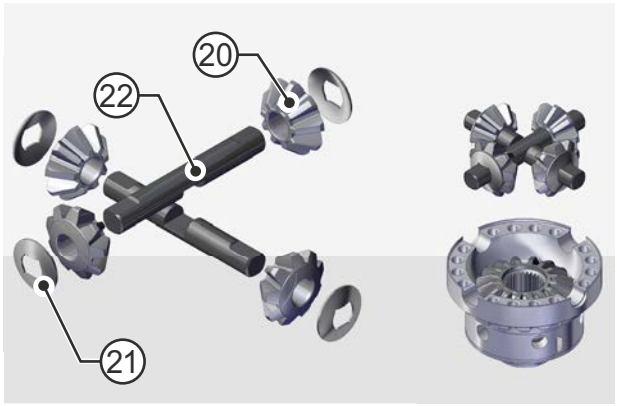


FIGURE 25: Install the satellite gears (20) and spherical shoulder washers (21) onto the shafts (22) and place into the differential housing (25).

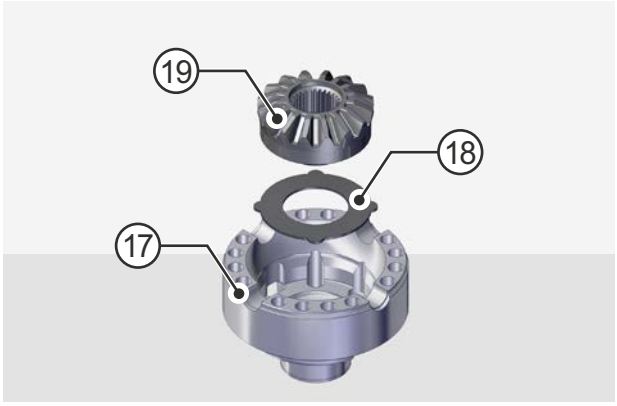


FIGURE 26: Insert planetary gear (19) together with shim washer (18).

FIGURE 27: Assemble the half boxes pieces (17, 25).

⚠CAUTION

The match marks on the two half-boxes must correspond.

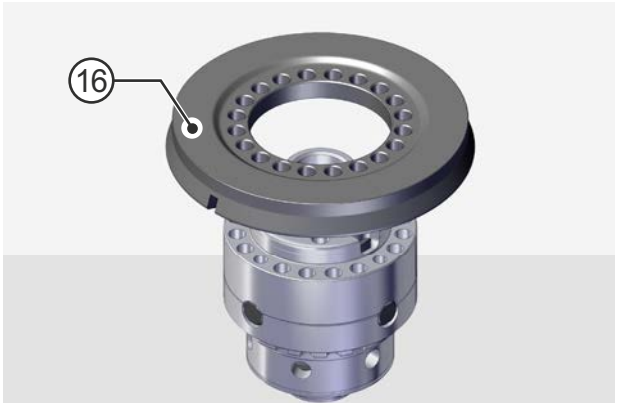


FIGURE 28: Install the crown wheel (16).

⚠CAUTION

If the crown has been replaced, reinstate clearances.

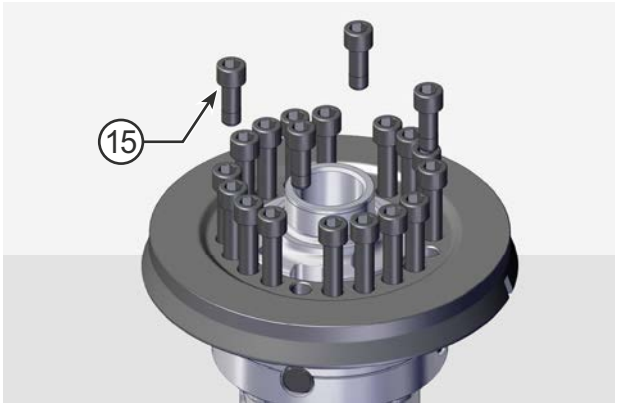


FIGURE 29: Position the crown (16) on the differential carrier and lock it with screws (17, 25).
Torque wrench setting: 104 - 128 N·m.

⚠CAUTION

Use only new screws pre-treated with Driloc locking adhesive. Threads must be cleaned from oil. Degrease only non pre-treated threads.

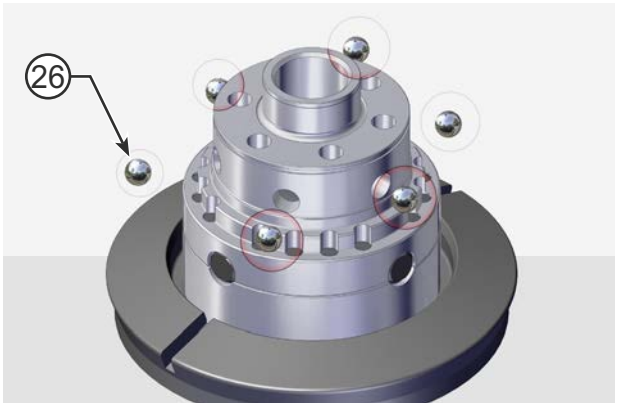


FIGURE 30: Grease and insert balls (26).

FIGURE 31: If removed or missing, assemble the swivel sleeve antirotation sleeve (16).

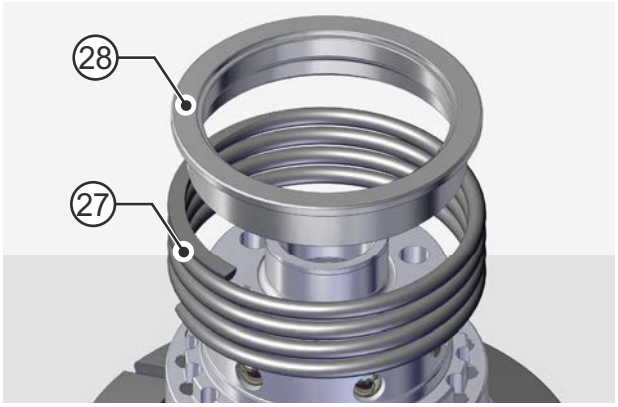


FIGURE 32: Place the differential carrier under a press. Load the spring (27) and the coupling (28).

NOTE:

Pay attention to the slot position that fits the coupling (28) to the anti-rotation key (6mm).

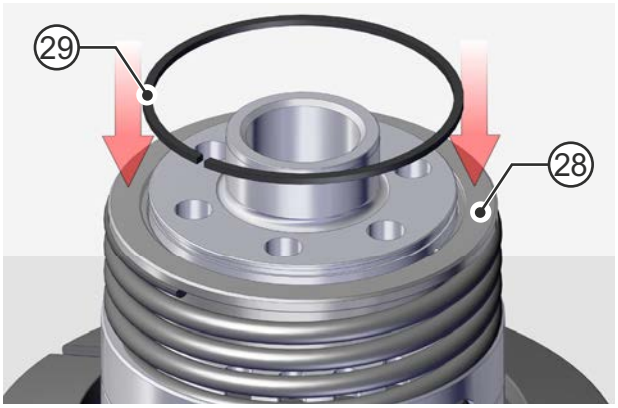


FIGURE 33: Install the snap ring (29).

⚠WARNING

Personal injury can result when installing snap ring.

The appropriate safety equipment must be worn.

To avoid injury to your eyes, wear protective glasses during this procedure.

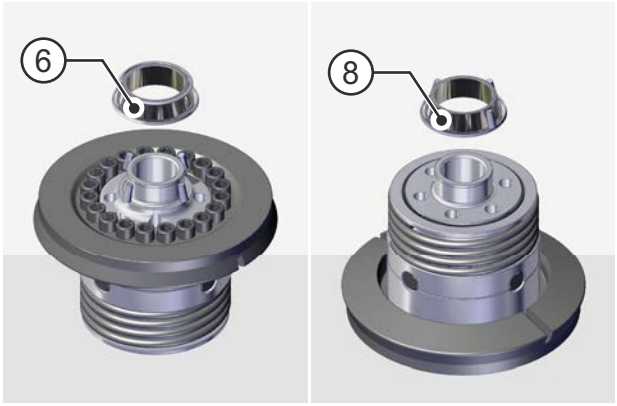


FIGURE 34: Heat the bearings (6, 8) to about 100 C° and fit it to the differential box (17, 25).

⚠CAUTION

Wear protective garments when handling hot objects.

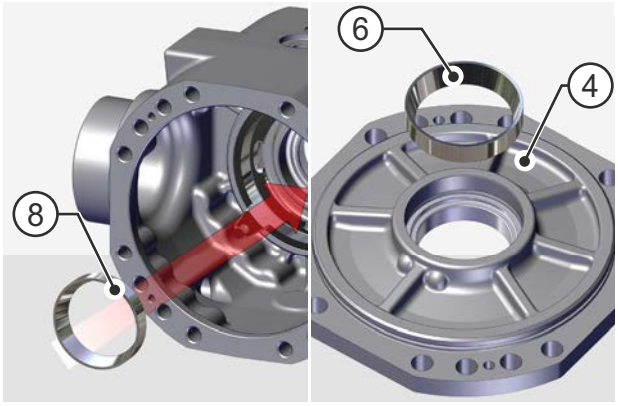


FIGURE 35: If the bearings are replaced, insert the external thrust blocks (6, 8) in the middle cover (4) and in the central body (12).

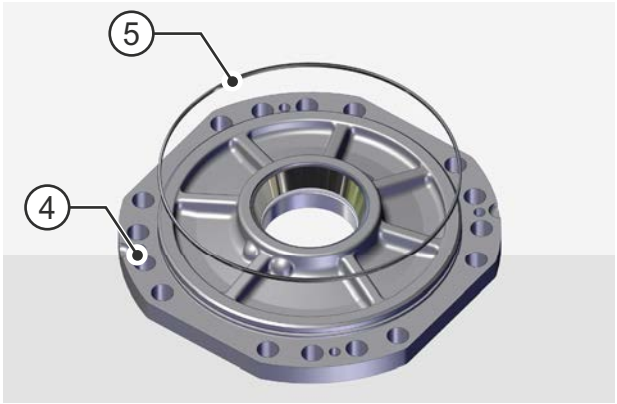


FIGURE 36: Insert a new o-ring (25) on the centering diameter of the arm.

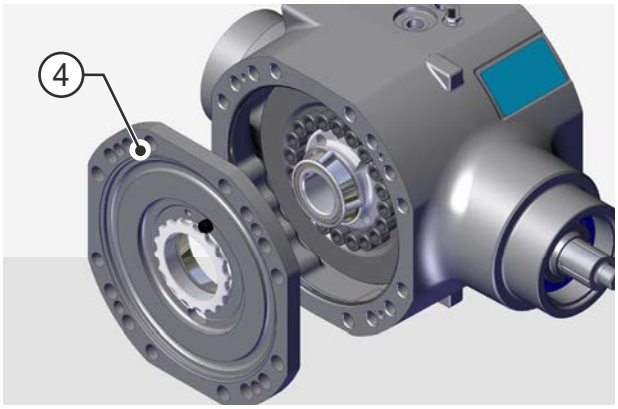


FIGURE 37: Position the differential unit (7) in the central body (12) with the help of a bar and fit the middle cover (4).

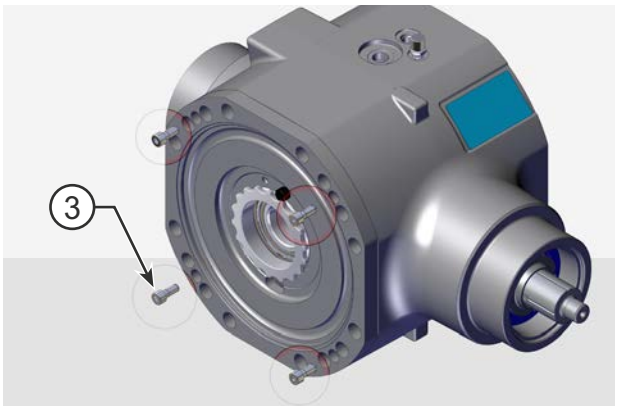


FIGURE 38: Lock the middle cover (4) with screws (3). Torque wrench setting for screw: 23.8 - 26.2 N·m.

⚠CAUTION

Use only new screws pre-treated with Driloc locking adhesive. Threads must be cleaned from oil. Degrease only non pre-treated threads.

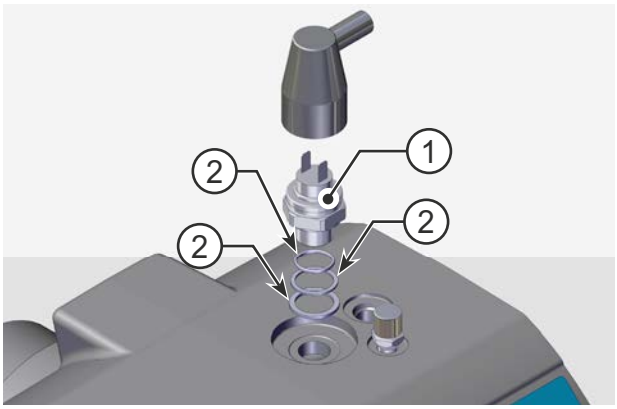


FIGURE 39: Install the safety switch (1) complete with o-ring (2); torque wrench setting: maximum 30 N·m.
If necessary, adjust differential unit clearances. (see DIFFERENTIAL UNIT p. 55).
Install the top cap and the arms. (For details, see CHECKING WEAR AND REPLACING THE BRAKING DISCS p. 19).

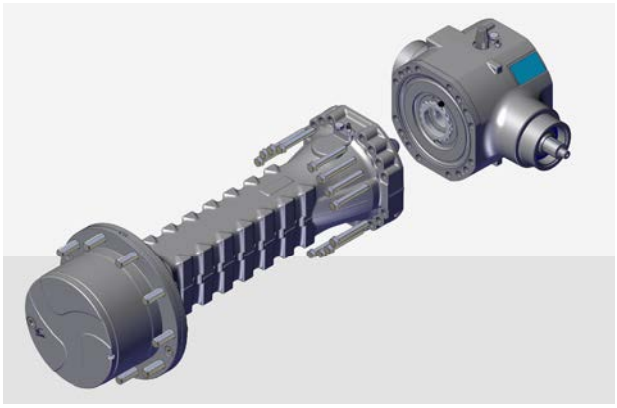


FIGURE 40: Re-install the complete arms.
For details, see CHECKING WEAR AND REPLACING THE BRAKING DISCS p. 19.

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